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# Agricultural & Horticultural Society

OF

# INDIA.

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## VOL. II.

PART I.—JANUARY TO DECEMBER, 1843.

ORIGINAL COMMUNICATIONS.

"A body of men engaged in the same pursuit, form a joint stock of their information and experience, and thereby put every individual in possession of the sum total acquired by them all."—REV. DR. WILLIAM CAREY.

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# THE JOURNAL

# Agricultural & Horticultural Society

# INDIA.

## *A comparative account of the relative position of Landlords, Tenants, Ryots, Produce, Labor and Wages, in India and England. By* A. Sconce, Esq., *Bengal Civil Service.*

[The Committee of Papers have much pleasure in giving publicity to the following communication which, Mr. Sconce states, has been written off from some private notes relating to the returns of Agriculture in India and England, and to the circumstances from which the difference observable springs. He entertains a very decided opinion, that a movement not less earnest and influential than what is going on at home should be made in this country, and that, however imperfectly he has expressed his own opinion, perhaps it may lead to an agitation of the subject, which, he conceives, could not fail to prove beneficial.]

It is my purpose to draw up a comparison of the relative position of landlords, tenants, rents, produce, labour and wages, in India and England. There is something yet to be learned; something to be taught; something to be done by the public on these heads. It is a subject on which, in India, people are pretty well indifferent. Here we have not yet advanced to that state of civilization, in which the poverty of the poor forces itself upon the notice—for the discussion—of the rich. Instead of having to lament our want of foresight at any future day, is there any thing we can take in hand now to alleviate, or if we cannot alleviate the reality, to postpone coming evils, or which shall suffer the operation of experimental and more soothing measures than haggard impatience, if it come suddenly, would permit.

I begin with rent and produce.

For England, I have not within reach that thorough detail which personal acquaintance with an Indian system and the statistical account of Scotland supply me, as regards this country and Scotland. In Porter's "Progress of Vol. 1, p. 177. the Nation," the cultivated area of England, in 1827, is shewn to have been 25,632,000 acres. In the Vol. 3, p. 137. same book, the annual value of landed property, (exclusive of dwelling houses, mines, &c.,) as assessed to the poors' rates in 1841, is stated to be £30,448,991. It is not absolutely accurate to compare the rental of 1841, with the cultivation of 1827, but we approximate the truth. This gross rental distributed over 25,632,000 acres, gives an average rent of £1-3 an acre. I am not aware how much the returns of the income tax exhibit the exact rental of the cultivated land in England to be in excess of the above assessment, and it is of less consequence, for conclusions deducible from so wide data are too general to serve the purposes of a specific and exact comparison.

Mr. Spackman in his statistics, taking the average produce of England and Wales, in wheat, barley, oats, rye, peas, beans, and potatoes, assumes the average annual outturn of an acre to be £6, that is, for the period of about twelve years extending from 1828: and allowing for more recent improvements, he considers the average of 1842 and 1843, to have risen to nearly £7 an acre. Rent is ordinarily considered to be one-fourth of the gross produce. In this case, therefore, gross produce being £7, or Rs. 70, the rent on an average should be £1-15, or Rs. 17 an acre.

As regards rent and produce in the Lothians, I find the Mr. Laings. following data given in the Atlas Prize Essay, on the authority of Mr. Gregg. The distribution of the gross produce in that highly improved district is said to be as follows:—

| | |
|---|---|
| Rent, ... ... ... ... | 33 |
| Expences, ... ... ... ... | 47 |
| Interest and Profit, ... ... ... | 20 |
| | 100 |

Mr. Gregg states, that rent there varies from £3-10 to £7 an acre. I will assume an average rent of £4-10 for the purpose of this enquiry. And thus, by the formula just quoted, rent being one-third of the gross produce, the total value of the gross produce (rent being £4-10, or Rs. 45 an acre,) becomes £13-10, or Rs. 135 an acre.

The following statistics of parishes in Scotland I select from the statistical account of Stirlingshire.

In Falkirk parish, rents are calculated in grain, convertible into money according to the prices of the year. Wheat alone is the grain in which the calculation is made. The ordinary grain rent is 10 bushels of wheat per acre. The average produce of an acre is 40 bushels. The maximum money rent in dear years is £4-15; but in recent years the minimum rent, calculated at 50 shillings the quarter, applicable in cheap years, has been the average rent of the district, namely, £3-2-6 per acre, or Rs. 31. At the same price, rent being one-fourth of the produce, the value of the gross produce becomes £12-10, or Rs. 125.

Two estimates are given of the produce of different farms in the parish of Campsie. The details I need not copy; the result is as follows:—

The produce of an inferior farm of 70 acres, rented at £110, is shewn to be worth £470; that is, the average produce per acre yields £6-14, or Rs. 67, the average rent per acre being £1-11, or Rs. 15.

The produce of a better farm of 120 acres rented at £300, is shewn to be £1235. Here the average produce of an acre is worth £10, or Rs. 100: the average rent being £2-10, or Rs. 25.

In St. Ninian's parish, the rent of the carse land is a grain rent, convertible into money, estimated at about a fourth of the average produce of wheat. This produce is about 5 quarters, and therefore at the not high price of 50 shillings the quarter, the value of the produce is £12-10, or Rs. 125, while the average rent is £3-2, or Rs. 31 per acre.

Mr. Porter quotes from the same work an account of the agricultural produce of the parish of Dundee. 3947 acres give an annual out-turn estimated at £29,912-10; or rather more than £7, or Rs. 70 an acre. The rent in this instance is not quoted, but it may be assumed to be one-fourth of the produce of £1-15, or Rs. 17 per acre.

These instances are sufficient to exhibit the position of an agriculturist at home. How low is the descent when we consider the produce of an Indian field! In this quarter, for instance, the produce, rather above an average, may be stated at 40 *arees* (an *aree* yields about 7 seers of cleaned rice,) of paddy to the local *kanee*, equivalent to 100 *arees* the acre. The value of this produce at the rate of 10 *arees* for the Rupee, is Rs. 10 the acre. Here, as elsewhere, the ryot-farmer retains one-half of the gross out-turn of his fields, and pays one-half in the shape of rent to his superior tenant of whatever grade. I will now insert an abstract, showing at one glance, the contrast between the produce, expressed in money, of land in India and England.

| *District.* | *Produce.* | | *Rent.* | | *Farmer's Share.* | |
|---|---|---|---|---|---|---|
| Chittagong, | Rs. | 10 | Rs. | 5 | Rs. | 5 |
| England, | „ | 70 | „ | 17 | „ | 53 |
| Lothians, | „ | 135 | „ | 45 | „ | 90 |
| Falkirk, | „ | 125 | „ | 31 | „ | 93 |
| Campsie, | „ | 67 | „ | 15 | „ | 52 |
| Ditto, | „ | 100 | „ | 25 | „ | 75 |
| St. Ninian's, | „ | 125 | „ | 31 | „ | 93 |
| Dundee, | „ | 70 | „ | 17 | „ | 53 |

I have no intention of discussing the principles of revenue assessments. *It is rather my purpose to shew,* that the land in England yields in money ten times as much as the land in India; and to suggest, that if there be any advantage to be attained by reaching the higher rate; if it improve the condition of the labourer and of the farmer, two classes who, apart from cities and towns, constitute the people of India, then the difference is worth studying, which rates the source of the incomes of this people at a tenth of the whole means which are at this time available in England, to be distributed among those who are dependent on land. If an Indian farmer got the whole produce, he would still be immeasurably behind the home farmer: he would still have to make up the difference between Rs. 10 and Rs. 53; or Rs. 10 and Rs. 90. Indeed, the smaller share which he now enjoys of the gross produce, one-half rather than a fourth, is to him a matter of the greatest moment. Some day it may be admitted, that it is equally so to us; some day when the feeding or starving of the people, when their peace or turbulence affect us more than the construction and maintenance of our personal fortunes; some day, for instance, not now; but when we have grown older, when we have advanced farther in the paths of intelligence and agitation, then, such questions as the fixity of tenure, and the establishment of poor laws may compel us to issue a commission to elucidate the then ancient history of evils which are now green, to acknowledge the existence and trace back the origin of certain rights or vested interests, which now it may be in our power to modify or reject. As I have said, the determination of the ryot farmer's share in his crop is to him no trifling matter; and it will be well if at a future day the lost opportunity to regulate the amount of his interests, or to define the minimum of his interest in his *jote*, be not sensibly appreciated. How is it now with the ryots in Ireland; forty per cent. of the farms there average from 1 to 5 acres.* To relieve them, a commission supported by the best wishes, if not with the entire confidence of the whole empire, has been appointed. On looking nearer home, how little have we to congratulate ourselves on the condition of the people, to whose well-being we have to administer.

I have assumed the produce of land in this quarter to be 100 *arees*, worth 10 Rs. per acre. An *aree* is a measure of capacity, weighing 13⅓ seers; 100 *arees* are equal to about 33 maunds. Doubtless the value of the produce of an acre is, under various circumstances, in excess of Rs. 10. Sometimes the land yields two crops; sometimes market vegetables are grown; sometimes *sooparee* (betel-nut); sometimes oranges; sometimes pepper; sometimes tobacco: but when we speak of the agricultural out-turn of an entire province, that general average which is common to the entire population, furnishes the best basis for the discussion of speculative truth.

How comes it then that the produce of an acre in India bears no higher relation to the produce of an acre in Britain than 10 to 70, or to 100, or to 125, or even to 135? If it be a secret, it is worth investigating; if it be attainable, it is worth attaining;—that power of economical philosophy which would raise the produce of India tenfold in value, whether the difference be intrinsic and real, or nominal and unsubstantial; or partly both; the absolute worth is in favor of the larger denomination. It is easy to conceive how high prices, not raised wages, may be of but equivocal advantage to the capitalist or labourer; but speaking generally, and comparing a higher standard of value with a lower standard, the higher in itself confers a positive boon on those whose concerns are regulated by its rate. It denotes an elevation in the scale of life; it places men on the best vantage ground, by giving them the amplest means of supplying their necessities either from their own markets, or from the markets of the world. On what then is the distinction founded, that describes the produce of an English farm by the number 100, while the Indian farm is described by 10?

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* Hurkaru, 22d October, 1841.

It cannot be owing to an actual difference in the value of money in both countries; for were money scarcer and dearer in India, there could be no foreign trade. But it may be that production, and the articles produced are cheap; in other words that wages are low and food cheap; and it is chiefly to the consideration of this point that I would confine myself. Money, rupees, or shillings, or pounds, is only a conventional mode of expressing the relative value of different articles produced in different countries. Though an acre of wheat in England be worth Rs. 100, and in India Rs. 10, it does not mean that the produce in the one case is 40 bushels, in the other 4 bushels; for all that the money value shews, the produce in grain may be nearly equal: and to ascertain the actual relation which the produce of an acre in one country bears to the produce of another, we must have recourse to a standard or denomination common to both. This standard is labour. I look upon the value of labour, as upon the value of any commodity, as being determined first of all by the cost of production. If you cannot go to the expence of producing anything, you cannot have it. The cost of production of labour, is the food of the labourer—the quantity of food by the support of which he lives and works. By enabling him to live, you enable him to work. And it is by the determination of this cost of working; by the determination of the power of an acre of land, in England and in India, to maintain this cost, that we may learn what, in each country, the power amounts to, and what is the worth (not in money but) in labour of the produce of an acre.

It has been calculated by Lord Fitzwilliam, that a labourer, his wife and three children, require weekly two-thirds of a bushel of wheat. The labourer's wages should therefore provide this support for himself and family. I will suppose an acre to produce 4 quarters, or 32 bushels. At the rate therefore of two-thirds of a bushel per week, thirty-two bushels would be equivalent to 48 weeks' wages. An acre would keep a labourer for 48 weeks.

The approximate exactness of this calculation may be otherwise shewn. In Mr. Tufnell's letter* to the Poor Law Commissioners, many instances are given of the weekly distribution of labourers' wages. The details are given of what is expended on bread, meat, butter, potatoes, and so on. As may be expected, the families being different, taste, frugality and management, or mismanagement, lead to varieties in the mode of expenditure. I will notice the effect of this in another point of view presently; meanwhile let me quote these cases: a man, his wife and six children, consumed 7 gallons of flour; in another case, a man, his wife and four children consumed 6 gallons of flour. Now 7 gallons and 6 gallons weigh respectively 42lbs. and 49lbs., so that the assumption is borne out, of two-thirds of a bushel of wheat, which weigh 40lbs. being requisite for the weekly use of a labourer's family.

In India I assume the weekly consumption of a family, to be 21 seers of rice; for instance, for the husband, daily 14 chittacks, for the wife 12 chittacks, for three children 22 chittacks; in all 48 chittacks, or 3 seers daily. I believe most men who have directed their attention to this subject, will admit this estimate to be sufficiently moderate. Now 100 *arees* of paddy produced on an acre, are equivalent to somewhat less than 700 seers of cleaned rice. And thus at the rate of 21 seers weekly, the produce of an acre, 700 seers, will maintain a labourer's family for 33 weeks.

It appears then that if nothing but bread or rice entered into the support of a labourer, the productive power of land in England and India, expressed in the *currency* of labour, would be in the proportion of 48 : 33. That is, while an English acre would be worth 48 weeks' labour, an India acre would be worth 33 weeks' labour. If this proportion were entirely exact; if no item had been left out which ought to be included, all other circumstances being the same, the actual produce of the land in both countries would be represented by the same figures. If an Indian acre produced 33 Rs., an English acre should produce 48 Rs., or as above assumed, the Indian acre giving 10 Rs., the English acre should give 14 Rs. But labour is not maintained by bread or rice only. A labourer lives also by salt, pepper, meat and fish. He may have *bĕgoons*, gourds and radishes, turnips and potatoes. Clothes and a house are as necessary as food. It is of course extremely difficult to determine to what extent allowances shoud be made for such items in a calculation such as this, and I can hope only to approach the truth more nearly, than is done by taking into account merely the main article of food.

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* Sanitary Reports.,

Mr. Tufnell, the Assistant Poor Law Commissioner, from whose letter, dated 1st March 1841, I have already quoted, gives various labourers' dietaries, shewing how their weekly wages are expended. In order to shew the sum spent in food, compared with the whole outlay, I give these extracts :—

| | *Total Weekly Outlay.* | | *Cost of Bread.* | |
|---|---|---|---|---|
| | *s.* | *d.* | *s.* | *d.* |
| 1st case | 11 | 9½ | 8 | 0 |
| 2d „ | 17 | 1½ | 10 | 6 |
| 3rd „ | 10 | 0 | 4 | 6 |
| 4th „ | 13 | 2¼ | 5 | 6¼ |
| 5th „ | 5 | 9 | 2 | 2 |
| 6th „ | 12 | 9 | 7 | 0 |
| 7th „ | 12 | 3 | 8 | 0 |
| 8th „ | 10 | 6 | 7 | 0 |
| Total, | 93 | 4¼ | 52 | 8¼ |

Leaving out fractions, the cost of bread amounts to about 55 per cent of the whole. For every 55 weeks, therefore, that the labourer lived, he would require the equivalent of 45 weeks' labour to expend on articles other than bread. Or the produce to be expended being 48 weeks' labour, it follows by the same proportion, that while 26 weeks' labour, or its equivalent in bread, were being consumed, the labourer required at the same time other commodities equivalent to 22 weeks' labour. If a labourer consumed nothing but bread, it would be correct to say, that in England the produce of an acre would support him for 48 weeks; not allowing for his other wants, it will support him only for 26 weeks. In England therefore it seems, we may say an acre is worth 26 weeks' labour.

As regards the produce of an acre in India, a modification similar, but in a less degree, may be made. I have already expressed the value of an acre at 33 weeks' labour, on the supposition that a labourer was supported by rice alone. He does not require much else. Still he must have salt and condiments, and if it may be, fish. Supposing his wages to be Rs. 2-8 monthly, it will take about Rs. 1-12 to buy himself and family rice, 90 seers, for 30 days' consumption. Possibly, thus, about two-thirds of what he earns is devoted to rice, leaving one-third for other necessaries: and at this rate what I have spoken of as being worth 33 weeks' labour, will be worth 22 weeks' labour. That is, making allowance for all the articles that enter into a labourer's maintenance, the value of the produce of an acre may be said to be 22 weeks' labour; for simultaneously with the consumption of 22 weeks' food, he will use also other things equivalent to 11 weeks' more.

By these deductions, therefore, it seems more nearly correct to say, that expressed in the labour of either country, an acre is worth in England 26 weeks,* in India 22 weeks' labour.

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* Assuming an average produce of 40 bushels, or 5 quarters, which is probably much in excess of an ordinary average.

This includes the larger deduction which the different habits of the English labourer require. If like the Indian, he required a deduction of only a third for etceteras, then the proportion would be 32 weeks to 22 weeks.

Can this help me to a solution of the question which I have proposed,—In what consists the real difference between the money value of the produce of land in India and England?—seeing that expressed in that primary medium of exchange, which is common to the wants of all countries, the ratio of the out-turn of an acre is 26: 22. In this latter case, the per centage being 100: 84, the difference is only 16 per cent.; in the former case, taking the money value of the produce of an English acre to be only Rs. 70, the difference is 700 per cent. Whether or no this is susceptible of a satisfactory solution; whether or no, if theoretically solved, we can turn the enquiry to a practical and useful purpose, it is at all events something to know that the apparent inferiority of the productive resources of India is not owing to physical, whatever may be said of social and economical influences. On the contrary, the natural capacity of both countries is nearly on a par; and there are other circumstances, which though not of unmixed advantage, tend to direct the operations of the capitalist in India, with greater efficacy and greater profit. In representing the value of an acre by the figures 26 and 22, it places the matter in another light to determine the money value of those periods of labour. It is sufficiently correct to assume the labourer's wages in England to be 10 shillings weekly, or 5 Rs.; and in India Rs. 2-8 monthly, or 10 annas a week; at those rates 26 weeks' labour are remunerated in England by Rs. 130, while 22 weeks' labour in India are remunerated by Rs. 14. It will be understood, that this mode of estimating the produce of land is quite distinct from the purely agricultural question of the most effectual means of raising this produce. It is not pretended, that wages are a specific portion of the gross produce. It is not pretended that the whole gross produce is distributed in the shape of wages.

Only in exhibiting the value of the gross produce of an acre in the common standard of labour, if we express this labour value in the money wages current in the country to which our discussion refers, we strike a very tangible comparison between the relative value of money and produce at different times in the same country, or at the same time in different countries. Thus while speaking of labour only, an acre in India is to an acre in England as 22:26; if we express this labour at the average rate of wages, the proportion widens so much as 14:130. Here the difference is ninefold. This is a sort of goal placed before the Indian husbandman, which he may strive to reach, to which those whose duty it is to help on, himself helpless, may pioneer his way. Only let there be Rs. 100 for distribution among the Indian agricultural interest instead of Rs. 10, and surely we have an indication, that the landlord may be more affluent, the farmer less embarrassed, the labourer better remunerated.

I have already assumed, for the purpose of illustrating this question, that expressing an English labourer's consumption by 100, 55 of this went to buy him bread, and 45 for other articles of food; and that while an Indian labourer consumed 55 in bread, he required only one-third of this, or 18, for et ceteras. In other words, the wants of an Indian labourer, in the matter of food, were 27 per cent. less than those of the English labourer; or the cost of living of the latter, his natural wages, exceeded that of the former by 27 per cent. It must be admitted, however, that the statement is incomplete. No allowance was made for house rent or for clothes; two very material items affecting the ordinary expenditure of English labourers. It is obvious, that if these charges could be with accuracy taken into account, the disproportion would be more than 27 per cent. The house rent alone of an English labourer at 2 shillings a week, is nearly twice as much as the entire wages of the Indian. Let the monthly wages of the one be 40 shillings, of the other 5 shillings; then add in the above proportion 27 per cent. to the latter, and the wages would be raised to 7*s.* nearly: but still between 7 shillings and 40 shillings, great disproportion has to be removed; a difference which the habits peculiar to the two countries do not appear by any means sufficient to justify; and more important than these, is the higher scale of prices in general, and of bread in particular. For instance, while an English labourer living for 55 weeks, (to continue the figures already used,) would at the rate of ⅝d of a bushel weekly, consume 36 bushels of wheat, at the cost of 225*s*, or 112 Rs.; an Indian labourer during the same period would consume 1155 seers of rice at the cost of 23 Rs. However necessary and considerable the Englishman's expenses, incurred in articles other than bread; in buying his bread only, he lays out nearly five times as much as the Indian. And besides this purchase of bread, supposing as before, 225*s.* to be 55 per cent. of his entire outlay, the labourer would have (in England) 184*s.* or 92 Rs. for his bacon, his beef, his sugar, his tea; while in India he would have only 12 Rs. for more than a year's consumption of vegetables and curry stuff; or supposing that the Indian's mode of life is altered, that he uses such things as the Englishman uses, or at all events that his outlay, on other articles than rice, brings his expenses on this head to a par with those of the Englishman; to meet this supposition let me add 27 per cent. to the ordinary wages, which in the case first put he would receive; thus his wages for 55 weeks being 35 Rs., an addition of 27 per cent. Rs 13, would raise the entire wages to Rs 48; and the sum of Rs. 12, ordinarily reserved for condiments and vegetables and meat, would become Rs. 25; so that were the mode of living, and the acquisition of articles necessary to the subsistence of the labourers of both countries assimilated, there would still remain the difference between 25 and 92 to be accounted for; to be secured if desirable, for the one: to be abandoned. if undesirable. by the other.

Whatever may be deficient in my demonstration, I may say probably, it is demonstrable that the difference observable between the money wages of labourers in India and England, arises from two circumstances; first, from the absolute difference in the scale of living, of each; the articles that enter into the necessary consumption of one, being more various, and of a more expensive sort than the articles required by the ordinary habits of the other; and second, from the comparative cheapness in India, of those provisions which principally constitute food. Both circumstances taken together, determine the low rate of Indian wages. I have already written perhaps more than enough on this simple point, and I should have thought it sufficient to say less, but that whatever is to be done to raise, at all events, the nominal wages and prices and profits of India to a grade more commensurate with the proceeds of industry in England, should be based on a clear understanding of the position which the Indian labourer, farmer, and capitalist now occupy. High wages, if they be nominally high, are not necessarily an advantage to the labourer. If high prices precede high wages, the labourer may be worse off than before; two cases strikingly exemplifying this self-evident fact are given by Mr. Tufnell, in the letter to which I have already alluded, and it may not be out of place to quote these examples here; the one is an account of the living of a labourer's family 50 or 60 years ago, at 6 shillings a week; the other in 1837, at 13 shillings a week:—

| 13s. *per Week.* | | | | 6s. *per Week.* | | | |
|---|---|---|---|---|---|---|---|
| | | *s.* | *d.* | | | *s.* | *d.* |
| 5 | gallons flour, | 5 | 6¼ | 4½ | gallons flour, | 2 | 3 |
| 2 | lb. butter, | 1 | 8 | | grinding ditto, | 0 | 5 |
| ½ | lb. candles, | 0 | 3½ | 7 | lb. beef, | 1 | 5½ |
| 3 | lb. cheese, | 1 | 6 | 2½ | lb. cheese, | 0 | 6 |
| | meat, | 2 | 0 | | oatmeal and salt, | 0 | 2¼ |
| 1½ | lb. sugar, | 0 | 10½ | 1 | oz. tea, | 0 | 2 |
| 2 | oz. tea, | 0 | 7½ | ½ | lb. sugar, | 0 | 3 |
| ½ | oz. soap, | 0 | 3 | | firing, | 0 | 3 |
| | pepper and salt, | 0 | 2 | | candles, | 0 | 3 |
| 1 | oz. tobacco, | 0 | 3½ | | soap, | 0 | 3 |
| | | 13 | 2¼ | | | 6 | 0 |

In the articles of bread, meat and cheese, it is clear that at the periods referred to, the high price more than neutralized the higher rate of wages, possibly a rise in wages might precede a rise in prices; the labourer having more to spend, would demand more and consume more; the operation of cause and effect in such a case would be of the most satisfactory kind: the labourer, enriched himself, would on the consumption of his wealth, help to enrich others: his wages should rise not only in name, but in reality. Now as a consumer, he is something of a free agent, he and others like him lead the tone of the markets; they are potent agents in determining prices; they are willing, as they are able, to *demand*, what was before supplied to them in stinted doles, measured by the urgency of not starving, rather than by the capacity of plentifulness and peace. A real rise in wages may be accomplished without, but not so surely as with, a rise in nominal wages; or rather in a poor and cheap country where the standard of money wages is low, the condition of the labourer can scarcely ever be improved except by paying him at a richer rate: while in a richer country, where the standard of social life is in every respect higher, and where prices, acting and acted upon, it matters not how, have reached a high scale, the labourer will more probably be benefitted by cheapening to him consumption, than by the possibility of his acquiring still higher wages to meet his current charges.

There is not much that can be done to the Indian labourer by cheapening his food; already his food is at the lowest. So may it be said of his housing; so may it be said of his clothing. If our purpose be to improve his condition, to give him much more of the comforts, even something more of the necessaries of life, we can scarcely grow him cheaper food, or build him a cheaper house: and though it is not so certain that we cannot give him a cheaper *dhotee*, the want is so rare, as not to form a material item with disbursements of monthly wages. This, however, and some other small things, do form exceptions; salt, for instance, is one of those other things. I have not at my command some of the more recent discussions on that question; but I think the laboured effort of the Salt Board in 1832, to maintain monopoly prices, much to be lamented. The Board, it seems to me, attempted to prove the sheerest paradox,—to prove that a high priced salt was as beneficial to the public as a low priced salt; to prove that the public consumed so much at high prices, that they would not consume more, if they paid less. I speak of a letter addressed to Government on the 26th January 1832. In the 79th paragraph, the Board represent the cost of salt to a coolie to be one-seventy-second (1-72) part of his annual wages; allowing him six seers at the cost of 10 annas, being at the rate of Rs. 4 per maund. But they write, as if the coolie alone required salt: they allow none for his wife or for his children; yet how precisely should this fail in an attempt to lighten the borne burdens of our national industry, if our measures were adapted only to a single workman, irrespective of the interests of those who are dependent on him for support. Ten annas yearly for a labourer himself, make at least 30 annas for himself and family: and every resident in India has not far to inquire, before he shall learn, that, not unfrequently, 30 annas are a whole month's wages. Did the Board calculate that what the labourer would save in salt, if the price were reduced one-half, would buy him a new suit of clothes? Nay, if it were reduced one-third, 10 annas would buy a new *dhotee*, and a new *chadur*: or supposing half the saving went to buy more salt, half might still be reserved for his wife's new gown. These matters are not trifles. Mr. Gladstone stated in the Colonial Quarterly, that English manufactures were consumed in India at the rate of six-pence per head of the population, taking the annual value of the imports to be, 5 millions: a saving* of 10 annas in a family of five persons, would make the five millions, seven.

They who have taken pains to inform themselves on the salt question, know how thriftily the natives use it. Not as we do, laying an unestimated quantity on the edge of our dinner plates, half for use, half for abuse; but keeping it in solution, every grain is saved, and is made to minister to the most careful economy. The recent reduction in the wholesale price of salt, can have scarcely any perceptible effect in lowering the retail prices. Hitherto, in many parts of Eastern Bengal, it has sold for Rs. 4-8, or even Rs. 5 a maund; possibly, but improbably, the future price may be Rs. 4. But eating for himself alone, the labourer, as assumed by the Salt Board, spent 10 annas yearly on salt: out of Calcutta most labourers have families, and as, hot or cold, they partake generally of the same food, a moderate computation would raise the consumption of salt from 6 seers to 18; from 10 annas to 30. One would wish to put the question to the Legislature in as many words, how much or how little of his wages do they require from the labourer; or, to disembarrass the enquiry I might say, from the more contemptible *coolie*, in liquidation of his annual contribution to the salt revenue. Ten annas to a poor man is an object; but if the tax amount to a whole month's income, most dearly have the public earned a deep remission of the present charges.

On the whole, however, it is little we can accomplish to render the current rate of wages more effective. It should be our more earnest duty to raise the rate itself, and with this ultimate object, immediately to increase the value of agricultural produce, so as to provide a larger fund for the remuneration of the labourer. It would be a fearful experiment to attempt this by raising the price of food; to begin by pinching the labourer, and then paying him for our very wantonness. And how begin? By limiting the supply, and thereby rendering his condition even worse than before. The worst of all systems of practical politics is, that which would make wages oscillate with the rise and fall of food, not food with the rise and fall of wages; which would make food dear in order that wages may be high; not wages high in order that the more easy condition of those paid by wages may lead them to demand more food, and to pay more for it. And in any of the inland districts of Bengal how peculiarly are labourers situated, how hardly treated! The tendency of things is to reduce rather than increase the remuneration for their labour. Take any old thannah* of this district. The lands are all cultivated; the population is full, has been full for ten, twenty and forty years, still numbers increase; there is a greater demand for food; a greater demand for employment without the means of giving more work to those who demand it; the demand exceeds the supply; work is done at a cheaper rate; wages are reduced from 2-8 to Rs. 2, or to 1-8; and how can this be helped? And what is true of one thannah, is true of an entire district, of an entire province. There is an increasing demand for food, keeping prices high; an increasing demand for work, keeping wages low; dear food, low wages, how ill they do assort! I am not going to inculcate a preventive check; to preach to the poor the privileges of the rich to marry and be given in marriage, the prohibition imposed by political economy upon them against taking to themselves wives, against peopling their villages with children. Improvement, then, equal to the increase of the population, if possible in excess of that increase, must spring from the funds devotable to the payment of labour, that is, immediately from the hands of the farmer. Give the farmer an object in employing more labourers; give him the opportunity of paying them better, and the Indian coolie may live and let live, as do other coolies throughout the world.

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* The population of the Bengal presidency may be stated at 70,000,000, or 14,000,000 families. A saving of 8 annas, or 1 shilling, in each family on salt, would amount to 70 lakhs of Rupees, or £700,000.

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* Local subdivision for Revenue as well as Police purposes.

It would be a miserable shift to force the price of those descriptions of produce which constitute the common man's food: to make him pay more for his loaf, that you may possibly return to him the excess in the shape of higher wages. It will be observed, I speak of forcing the price of food, which is a very different thing from the natural rise of price that attends the progressive advancement of Society, if it be not the immediate and perceptible effect of the already attained prosperity of the labourer himself. But if by a simultaneous effort throughout the country, and among the farmers of the country, apart from the personal interest and single and solitary attempts of European planters, the richer products of sugar, flax and hemp were established, it is unquestionable that in reaping even the first harvest, its value would exceed twice or three-fold that of rice; all connected with the soil would necessarily benefit; the landlord receive greater rents, the farmer larger profits, the labourer higher wages. It is possible to conceive that in time, land set apart for the cultivation of rice would be contracted; that it might be brought to market with greater difficulty and in less quantity, hence that its price would be increased; but the change would affect men who were already prepared to meet it, whose wages had already risen, whose general comfort and prosperity were being disseminated throughout all the branches of the agricultural community.

It is by the encouragement which influence can direct, by the rewards which wealth can offer, that so great a revolution in the character of Indian agriculture is to be begun, to be gradually extended, to be finally accomplished, and seated familiarly round the *bheetas* and *khumars* of Indian farmers. Perhaps too much stress has been hitherto laid on the wretched condition of Indian husbandry, as if *that* were the cause of the difference in the value of the produce of land in India and England; whereas the difference is owing little to inferior productiveness, and chiefly to the higher prices of produce in England. If therefore we were to confine our efforts to the introduction of better ploughs, and of stronger cattle, to the adoption of more careful tillage, and generally were to confine ourselves to the improvement of the present system, inattentive to the benefit derivable from the introduction of new staple products, however sensible the change in favour of the farmer, we should still withhold the advantage that would certainly result from the growth of articles that would fetch a high price in the Europe market; that would on the whole add very materially to the value of the produce of land, and so, of the land itself; and that would elevate the farmer to a scale, in which his condition might be envied more, and pitied less than at present.

Advanced as the agricultural interest in England is compared with India, it is now more, than that at any former time, that they have discovered at home how much yet remains to be done, to extract from the land the enlarged returns of which it is susceptible; and accordingly while the whole island has been instructed by the Prime Minister himself, as to the necessity of bestirring themselves, all admit the feasibility of accomplishing the improvements which the science of agriculture, partly by successful practice, partly by the expression of conclusive principles, encourages every man to adopt. There is scarcely a county in which by the occasional assemblages of Royal Societies, or by the more regular meetings of plebeian farming clubs, the vast importance of the subject is not steadily proclaimed, where the successful efforts of some are communicated and rewarded; and where others are taught to follow examples which it is as much the interest of individuals as of the nation, should be copied and realized. It would be hard to say that some such effort is not wanted in India or that the conviction of *our* prime minister, on the subject, should not be as strong as the conviction of Sir Robert Peel. It cannot be thought that the ryot is better able to act for himself than the English farmer; that the improvements necessary in India are more easily attained; that fewer and less strong prejudices have to be overcome; or that here greater intelligence is more than a match for greater difficulties. Then by all means, give him the benefit of assistance, which elsewhere is indispensable. True, the services of our own metropolitan society are invalu- [illegible] but it does not profess, and cannot act as an instructor [illegible] tens [illegible]sands of farmers, for whose improvement as I now write. The agriculture of India is not to be [illegible]ed, by the s[illegible]sion of samples grown in European's g[illegible]ns. In the Mofussil, as well as in the City, organization is wanted; and perennial life, I may add, as well as the sketch of an organized system. Time is wanted, and duty and funds. Time to superintend; duty which cannot evade the superintendence; and funds to ransom the spirit of self-interest and self-improvement from the thraldom in which it is held to prejudice and ignorance.

There is obviously no duty to which a Government can postpone the consideration of feeding the millions, whose human lives are dependent on an adequate supply of food. The fact is unquestionable, and we all know how deplorable, that a nation cannot be left to its own resources, to feed itself. The events which mark the stages of its social progress are too fortuitous to be certainly regulated by the operations of the best (and how much do men differ as to what is the best) political system. For specific events, we must use specific remedies. To attain certain ends, we must employ means calculated to effect our purpose. Possibly, by something now in our power to perform, we may postpone for a generation the necessity of promulgating poor laws. There is obviously nothing in the connexion of India with England that requires us to run through the experiences of English history; to start with a 43d Elizabeth, and live our two hundred and fifty years before we determine the proper modes of relieving the distresses of the poor. One may assume that in India public poverty has yet to shew itself. Provincial and agrarian poverty, at least, is not looked for. How much, if looked for, might be seen, is another matter. Hitherto, India has been not only an agricultural, but to the extent of its home consumption, a manufacturing country. A piece of British calico is rarely or never seen among the merchandize of an inland *Hât*. The cloths thus exhibited are all home-made, and at this season in particular, when altogether new efforts are made to supersede the hand-looms of India, by carrying the fabrics of Manchester and Glasgow to the *ghât* of every village, some consideration should be shewn for the weavers, whose occupation is about to cease. How easy it is to talk, how delightful to British merchants the anticipation of spreading throughout the washing greens of India, Manchester *dhotees*, and *chadurs* and *sarees!* As if in India now men walked naked, and had to be taught the fashion of wearing clothes, not provided with the means of purchasing them. And having attained this purpose, having so to speak given every manufacturer his man, his many men, so that each wearer has his name enrolled as a customer of a power-loom factory; having done this, are we prepared with measures fitted for lands without work, for stomachs without food, which has resulted from the displacement of home-made, and the introduction of foreign manufactures? If we believe that trade is still susceptible of shocks; that the busiest factories may become untenanted and silent, that the busiest workman may become a spectacle of gaunt, but most reluctant idleness, then we admit that every piece of English manufacture that we sell, carries destitution into an Indian village. Here then is another inducement, another justification, for the State concerning itself in the improvement of the agriculture of Bengal. It is the declared policy of Great Britain to supply as much of its manufactured goods as can possibly be taken off by the markets of India. We know on the other hand to what this must inevitably lead. We see a policy being daily enforced, which must have the effect of rendering India more exclusively an agricultural country, of withdrawing the livelihood of that portion of the population which at present supplies by far the largest proportion of the clothes worn by the Mofussil community, and of forcing them to seek their food by falling back on the already overstocked agriculture and agricultural labour.

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## *A Gardener's Calendar for Darjeeling. Communicated by* A. CAMPBELL, ESQ. *Superintendent of Darjeeling.*

*To* JAMES HUME ESQ., *Honorary Secretary, Agricultural Society.*

MY DEAR SIR,—I have the pleasure to send you a Gardener's Calendar for Darjeeling. It may be interesting to the members of the Society, although very far from being complete.

As yet gardening is still in its infancy at this place; and therefore the calendar is offered more for the purpose of slightly assisting those who commence operations here, than as a sure guide to their proceedings.

Your's truly,

A. CAMPBELL,

*Member, Agricultural Society.*

*Darjeeling,* 16*th December,* 1844.

### *Gardener's Calendar for Darjeeling.**

*January.*—There is not much to be done in the garden this month, the frost is too steady to admit of successful sowings, although it does not in ordinary years kill the growing plants. Peas come into blossom, and go on to seed under nightly frosts, with occasional sleet. Nor does a fall of snow impede their progress in sheltered situations. Delve and manure your ground this month, and protect geraniums and any other tender plants from the frost, by suspending pieces of mat or canvas over them. *If it snows heavily, cover in your artichokes to prevent their leaves breaking, also lupins for the same reason. Turnips, carrots, beet* and cabbage are our only vegetables this month, except parsley and mint, which are in season throughout the year. The walnuts, oranges, and limes from Sikkim are our only fruits.

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* Elevation of Darjeeling garden grounds 7,000 feet.

*February.*—Plant some potatoes about the middle of the month, and sow a few vegetable seeds in boxes in the verandah; about the end of it you may sow peas and French beans, after the 15th, as well as radish and cress. Put manure to the strawberry beds, and about the roots of the artichoke plants; also over the rhubarb beds. Turnips, carrots, beet and cabbage sprouts, only from the kitchen garden. Lupins and marigolds from the flower one. Turnip, cabbage, radish, and cauliflower seed stocks are in flower.

*March.*—Finish the planting of your potatoes this month. Sow peas and beans; put dahlia bulbs in the ground; sow vegetable seeds in boxes under cover, and protect your seedlings as much as possible from a small "turnip fly,"* which is very destructive to them all this month and the next, and in May also, unless there is a good deal of rain. Plant out any seedlings you have raised in February; trim your strawberry plants, and clean about their roots. The peach trees blossom this month and the next, and carry their fruit till September, when they are full grown, but not ripe, although very good for stewing; oranges still in season. The magnolia and the red and white rhododendron flower about the middle and end of the month. Protect your seedlings, young vegetable transplants, flowers and peas, if you can, from hail showers. Turnip, cabbage sprouts, and young radish and cress only for the table.

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* See account of this insect by Dr. Pearson, in the Transactions of the Agricultural Society, Vol. VII.

*April.*—Sow peas, beans, and French beans, carrot, turnip, lettuce, radish, parsley, cauliflower, and other vegetable seeds; *you may also plant potatoes. Sow artichoke seed and rhubarb. Plant out cabbage and cauliflower seedlings; sow dahlia seed, and put their tubers in the ground.*

*May.*—Sow vegetable seeds of sorts, including American squash, and plant out all kinds of seedlings; transplant white clover and dahlias, and generally any plants or flowers you wish to move, except heart's ease which is now seeding. Strawberries (English) come in this month, and the yellow wild raspberry; you may have peas in abundance, also French beans, sallads, turnip and cabbage. Numerous flowers adorn the jungles, and your garden may have roses, the scarlet lily, yellow rhododendron, heart's ease, poppies, larkspurs, snap dragon, pinks, lupins, &c.

*June.*—Sow radishes, turnips, cabbages, and lettuce; also lupins, sweet pea, and other hardy flower seeds. Make pink, sweet william, and rose cuttings, and plant out dahlia seedlings and nasturtia; transplant white clover, raspberries for green banks, strawberries, rhubarb, flowering and other shrubs. This is the best month for transplanting. The vegetables on the table this month are peas, French beans, turnips, cabbage, radish, cress, cucumber, bhangans, lettuce, new potatoes, artichokes, and rhubarb for tarts. Parsley now and all the year round. The fruits are strawberries (English), and the ground raspberry. Pinks, tulips, sweet william, sweet peas, lupins, mignonette, poppies, heart's ease, roses, snap dragon, larkspurs, &c. are the ornaments of the garden; but a great variety of air plants, and others of exceeding beauty, adorn the neighbouring woods. The heart's ease sheds its seed this month, and during July you have abundance of young plants of it, for transplanting into beds or borders. The fuschia under cover, flowers this month, and continues to do so till November. In the open air it does not flower so early, and ceases to do so sooner.

*July.*—You may in the early part of this month sow radish and cress, and a few of the hardier vegetable seeds; but you cannot do much in that way in consequence of the heavy rain; vegetation is rapid, and you will find enough of work in keeping the garden clean. You may plant out strawberry runners, and transplant cabbages, brocoli and cauliflowers. For the table you should have carrots, turnips, radish, cress, cabbage, and American squash, and you may have a few peas and French beans in the early part of it. From the lower elevations of Badamtam, Tugvor, &c., you have fine bhangans, cucumbers, capsicums, and tender Indian corn cones, with inferior love apples, and unripe mangoes for tarts. The ground raspberry is in great abundance, and a good and wholesome fruit eaten with cream and sugar; make jam and jelly of it this month. The black bramble-like raspberry, you also have, but it is of inferior flavor. The small gooseberry-like figs are abundant, eat them when fresh pulled, and without sugar. The forest flowers are the lilac, convolvulus, the gigantic yellow plume-like lily, saxifrages, and biggonias, the orange and purple orchis, with many others. In the garden you have heart's ease, lupins, roses, sweet pea, gerania, evening and large yellow primrose, dahlias, sweet william, hollyoak, mallows, snap dragon, marigolds, &c. &c.

*August.*—Plant potatoes in fresh ground, or in the ground from which you have been digging them, giving the latter a dose of manure at the time of planting. Towards the end of the month, sow peas, beans, scarlet runners, Spanish and French beans, cabbage seed, turnip, beet, radish, and all the common table vegetables. Take up and store your early potatoes, as the tops wither after the middle of this month. The vegetables for the table are cabbages, French beans, scarlet runners, radishes, lettuce, parsley, turnips, lal saug, squash, vegetable marrow, asparagus, carrots, and cucumber. The wild fruits are large, and small figs, raspberries, and wild grapes. The large figs are very good stewed in port wine, and pretty good simply dried. The smaller ones are best when fresh plucked. The flowers in this month are abundant in the forest, as well as the garden. Dahlias, pinks, roses, lupins, (blue, yellow and variegated,) mallows, large yellow and evening primroses, sunflowers, rose campion, larkspurs, heart's ease and marigolds are among the latter; honeysuckle, a lilac, and a blue convolvulus and orchideæ, innumerable from the former.

*September.*—Continue to sow peas, beans, and all table vegetable seeds. Plant out young cabbages, brocoli, cauliflower, and nohl kole. Take up and store the remainder of your first planted potatoes, trim your strawberry beds of their runners and dead leaves. Plant out runners in new beds, and make some rose cuttings. Take up your tulip bulbs. The table vegetables this month, are turnips, carrots, salad, beet root, nohl kole, savoys, cucumber, squash, and love apples; bhangans, capsicums, and pumkins from the neighbouring vallies. The garden flowers as last month.

*October.*—Sow peas, beans, and all sorts of table vegetable seeds for spring use during the early part of the month. You may still plant out strawberry runners; cut down your rose bushes, and thoroughly weed and clean your grounds and garden for the cold weather. Take up and store the remainder of your potatoe crop by the 15th. You may plant out celery in trenches early in the month, as well as cabbages and nohl kole in drills.

*November.*—We do very little in the garden this month, as far as sowing is concerned; all our seeds for spring and summer use should be sown before the end of October. We have carrots, turnips, radishes, beet root, cabbages, savoys, &c., and from Tugvor we get green peas, turnips and radishes; salads from the first sowings after the rains. The gardens suffer during this month from the dryness of the atmosphere during the day, and from the night hoar frosts.

*December.*—This may be called a blank month, as far as active operations are concerned. We have nightly hoar frosts, and vegetation is nearly at a stand still. The pea crops, however, begin to flower, and the vegetables from the September and October sowings remain healthy, although they do not grow much towards maturity.

In gardens not terraced, there is annually a great loss of the good part of the soil during the rains, which renders it necessary to replenish the ground with vegetable mould manure during this month, so as to give the new soil the benefit of the frost; black mould is procurable in any quantity in the forests about the station. We have all the ordinary vegetables in this month, except peas, which we get from Tugvor.* With little care we could have a good supply of vegetables all the year round; Eastern and South-eastern exposure seem the best for vegetable gardens. Potatoes are planted at Tugvor about the end of this month, and are ready for the table in May.

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* About 1200 feet lower than Darjeeling

## *Correspondence relative to the flourishing state of the Grain Trade of Arracan, with suggestions for its further improvement. By Major* Bogle, *Commissioner of Arracan.*

[Communicated by the Government of Bengal.]

*To the Honorary Secretary, Agricultural and Horticultural Society.*

*Revenue.*

Sir,—I am directed by the Right Honorable the Governor of Bengal, to append copy of a letter from the Commissioner of Arracan, dated the 11th instant, applying for a quantity of Carolina paddy seed; as to the expediency and best mode of supplying which, His Excellency will be happy to be favored with the views of the Society.

I have, &c.

Cecil Beadon,

*Under-Secretary to the Govt. of Bengal.*

*Fort William, 27th November,* 1844.

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(Copy.)

No. 79.

*From Major* A. Bogle, *Commissioner in Arracan, to* F. J. Halliday, *Esq., Secretary to the Government of Bengal, Revenue Department, Fort William.*

Sir,—Rice being the great staple of this province, it has for many years past been my most anxious wish to see a better description of grain introduced, and such steps taken in the cleaning and preparing of the produce for exportation as might materially enhance its value, and adapt it for exportation to the most distant parts of the world.

2d. With this view, I have for several years endeavoured to procure, through the Agricultural and Horticultural Society of Calcutta, a supply of Carolina paddy seed, but I have never succeeded, except to a very limited extent, just sufficient indeed to establish the fact of that grain being admirably suited to the soil and climate of Arracan, and of so productive a nature, as to secure it a high place in the estimation of the Mugh cultivators, amongst whom I distributed it.*

3d. Finding that I am unable to procure this valuable description of seed by any ordinary means, I consider it my duty to bring the subject to the notice of Government, and have to request, that measures may be adopted either through American firms, or others engaged in the grain trade of Calcutta, or through the Court of Directors, for supplying me with 500 bags of the best Carolina seed paddy procurable, so that if possible, it may reach Akyab by the month of June next. It is essential that the grain should be *seed* grain, and in good condition.

4th. Should my request be complied with, it is my intention to distribute the seeds amongst the best Kyouks of this district, on condition that they return to me in produce four maunds for every one of seed supplied, and this I would again distribute to all the Kyouks of the district upon the same terms, and then I would extend it to other districts in the same manner, and thus one of the finest descriptions of paddy known, would in the course of a few years, become common throughout the whole province.

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* Extract of a letter from W. HAWORTH, ESQ., dated Calcutta, 5th December, 1844, in reply to a communication from the Secretary of the Society.

"I would beg to remark, that all our endeavors so far, to obtain good Carolina seed paddy, either on our own, or the Society's account, have been exceedingly unsuccessful in the result; at the same time, I should observe, that the causes have been more accidental, than from any real obstacle in the way of introducing this very desirable seed into the country. The first lot we imported, was very good seed, but it arrived too late in the season for an extensive cultivation; however, the little which was sown by ourselves, and distributed to friends, as well as most of that which the Society distributed, gave a good return; the rice prepared from the yield of the seed sown on our own ground, was some of the finest I ever saw. We had a large quantity of the original seed carefully kept over for the following season, and prepared about 80 beegahs of land for it, but scarcely a seed vegetated. Our next order for seed, was lost in the "*Memnon*" steamer, and it was again too late in the season for our Liverpool friends to act on the duplicate order, so as to procure seed direct from Carolina in time for the sowing season here; they were unsuccessful in meeting with a lot likely to answer, in Liverpool, and here the matter now rests. I have at present no expectation of any being sent without fresh instructions being forwarded from this. I shall be very happy if my services can be made available in procuring a supply through Liverpool."

5th. The trade of this port has increased wonderfully; in 1828-29 the quantity of grain exported only amounted to 170,000 maunds, whereas in 1839-40, it exceeded 24,40,000; but in 1843-44 it fell off to 13,60,000; this great variation is attributable to the grain of Arracan being as yet but little cared for in distant countries, owing to its coarseness and its tendency to decay rapidly from not being boiled in the husk, and to abundant harvests on the Coromandel coast, to which the greater portion of the annual surplus of this province has hitherto been exported; but new and valuable markets having lately been opened to us in consequence of the failure of crops on the Islands of Java, Sumatra, Balli, &c. and a considerable demand for rice having sprung up at Singapore, probably owing to the increased intercourse with China, I am of opinion, that if we could only improve the quality of the grain of Arracan, and the method of preparing it for exportation, a point to which I am devoting as much attention as is compatible with my situation, I am convinced that a very great trade may be established between this port and almost every place between Bourbon and Singapore, more particularly with the Mauritius, Ceylon, Maulmain and Penang, if not indeed with England, and which will render the prosperity of Arracan quite independent of all calamities befalling other provinces.

6th. I therefore trust the Governor of Bengal will grant me his assistance towards procuring a superior description of paddy seed for distribution throughout this province.

I have, &c.

(Signed) A. BOGLE,
*Commissioner of Arracan.*

*Arracan, Commissioner's Office,*
*Akyab, the 11th November, 1844.*

### *Memorandum accompanying a piece of Teak from Arracan, forwarded by Major* A. BOGLE. *With a report on its quality, by Captain* H. GOODWYN, *Bengal Engineers.*

The teak wood, of which I send you a sample, is considered to be very fine and superior to that of Moulmein. It was cut up the Kaladyne river, a noble stream which falls into the sea at Akyab, and the pity is, that there is not more of it. The existence of teak at the place where this was found has long been known, and last year I obtained a tree from it, but the difficulty in getting it down to the river-side, and then floating it 100 miles to this place, prevented my getting more. A few months ago, an enterprising merchant of this place conceived it to be practicable to form a settlement amongst the hills, and fell teak timbers at a remunerating profit, but the locality having since been visited by my Junior Assistant, Lieutenant Hopkinson, it is found that the trees are few in number, much scattered, and generally too small to be of much value; and moreover, that the natural obstacles opposed to their removal to the river-side are of too formidable a nature to warrant the hope of any real benefit being derived from the teak of the Kaladyne. There are, however, many other very valuable descriptions of timber procurable in the interior of Arracan, which may be felled and exported with advantage.

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The specimen of the teak sent by you for examination, appears to be a tough and strong wood, adapted, I should imagine, for ship purposes; as from its oily nature, iron will not easily corrode in it. It will do for furniture too I should think.

Sp. gravity about ·830. Compared with oak as a standard @ 100, its properties appear to be

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|---|---|
| Stiffness or resistance to flexure, ... | 98 |
| Strength or resistance to fracture, ... | 104 |
| Toughness, ... ... ... ... | 94 |

The test was a difficult one, as fracture took place at a knot, but judging from the weight which produced deflection and fracture, the above is an approximation to truth.

Fracture was produced by 3052 lbs. Deflection of one inch with 1260 lbs. The piece subjected to trial, was 2 feet long and 2 inches square.

*5th December*, 1844.

## *Memorandum accompanying a sample of Tobacco from Sandoway, in the province of Arracan. By Captain* A. P. PHAYRE, *Senior Assistant to the Commissioner of Arracan.*

[This memorandum was drawn up by Captain Phayre, at the request of Major Bogle, Commissioner of Arracan, who conceives[*] that although, at present, it would be difficult to procure any large quantity of the *very finest kind* of tobacco, similar to the sample sent by him, yet he has not the least doubt that were the demand large and steady, the supply would be very considerable. Major Bogle states, that of the *ordinary* description of Sandoway tobacco, which is an article of a very excellent quality, several thousands of maunds may be procured at the proper season; and having a perfect recollection that, when he was an Assistant at Sandoway, many years ago, plains which are now devoted to rice cultivation were then covered with the tobacco plant, which he has known to sell at 16 and 20 Rs. per maund, he is confident that the district is capable of supplying immense quantities. Major Bogle further observes, that Sandoway is not the only part of Arracan which produces a superior tobacco, but that every stream in the province does the same; and that the population is now increasing so rapidly, that as soon as a great demand for any agricultural product may spring up, it is sure to be met by great extension in the cultivation of the particular article required, and it is difficult to assign the ultimate limit of the supply. "In point of quality," adds Major Bogle, "I believe few parts of India can produce a more delicate tobacco than is raised here, and I am surprised that it is not better known, and more sought after."]

This is a sample of the best sort of Sandoway tobacco.[†] It is made up for sale in bundles, without much regard to weight, like the accompanying sample. This contains four bundles, and weighs about 10½ seers, *Bengal weight. It was procured in the town of Sandoway, and cost, delivered at my house, Rs. 2: 10.* This has been the average price of this sort of tobacco for the last four or five years, being at the rate of Rs. 10 : 8 per Bengal maund.

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[*] Major Bogle, in a letter to the Secretary, forwarding the Memorandum.

[†] Mr. John Rose, (firm of J. Vanzandyke and Co. tobacconists,) pronounces this specimen to be the finest he has ever seen from Sandoway. He thinks,

This tobacco was grown, as is all of the best sort, on the banks of the Sandoway river, about 20 miles by water above the town, and about 30 by water from the sea. The land is above the influence of the tides, but is flooded in the rains. It is chiefly grown by persons who go there for the purpose, during the proper season, from the vicinity of this town. The tobacco is to be procured from these cultivators in small quantities from each. Not more than from 50 to 60 maunds of the best sort could be procured in one season. The proper period for purchasing is in May and June. This best sort of tobacco is said to be produced by pruning the plants, and not allowing more than six or seven leaves to remain on each stalk. The usual native traders from Cox's Bazaar and Ramree have now arrived to make their purchases, being somewhat late this season ; but they chiefly look out for the inferior tobacco, the leaves of which are much smaller than these, and fetch here not more than from 4 to 6 Rs. per maund.

The Sandoway tobacco has now I understand got a bad name in Bengal, in consequence of the inferior sorts having been mixed up with the superior. If a proper selection were made, there is no doubt but tobacco here would be found to suit Europeans remarkably well.

All that would be necessary to secure, say 50 maunds of this tobacco, would be to depute an intelligent native to Sandoway in the months of May and June to go among the

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however, that by the application of proper manure, and a judicious pruning of the plant, a leaf of much finer texture, with much smaller ribs, would be produced, and thereby a very easy drawing cigar could be made from it.

cultivators, and pick out their best leaf. For the present season it is perhaps too late to secure more than 20 or 30 maunds. *No difficulty would be found in dealing with the cultivators. The tobacco could be conveyed hence in small boats to Kyouk-Phyoo for shipment. There is no export or other duty.*

*It must be remembered, that if a sudden demand were* made for 50 or 60 maunds of the best tobacco, a quantity never perhaps sought for before all at once, that prices might range higher than the average I have here given; viz. 10 : 8 per maund.

*Sandoway, August,* 1844.

## *Particulars regarding the fibrous properties of the Jeetee Plant; (Asclepias tenacissima,* Roxburgh,*) communicated by* C. B. Taylor, *Esq. With a Report on the strength of Rope made therefrom in comparison with other fibrous substances; presented by Captain* T. E. Rogers, *Master Attendant.*

To James Hume, *Esq., Honorary Secretary, Agricultural and Horticultural Society.*

Rajharra Colliery, Palamow, 12th November, 1844.

My dear Sir,

About a month ago I observed some of my boatmen twisting a substance into thread, which had much the appearance of silk, and which I had never seen before; they called it *chittee*, and informed me, that it was the fibres of a small creeper found growing spontaneously in the jungle, and which they made nets of, finding it much stronger and more durable than hemp, and not so liable to rot by being kept in water. I employed the boatmen to collect a quantity of the filaments for me, but for which they charged me about 2 rupees a seer; this price is so high, that it could scarcely be converted to any useful purpose; but this obstacle may be overcome, as the creeper takes only three or four months to grow, and it could therefore, I think, be advantageously raised from seed in a field. The seed gets ripe and ready for gathering in January; part of the *chittee* collected by the boatmen for me, I have had made into a small rope 3 feet in length, and which I forward to you by this day's dâk banghy, also a sample of the filaments, with a few pieces of the creeper itself. The rope I think you will find very strong, but having no English rope by me, am unable to put it to the test; this I must leave for you to do. To separate the filaments from the wood, the creeper, after being plucked, is allowed to dry, and then broken into pieces of a foot in length, it is then steeped in water for about an hour or an hour and a half, which renders the separation of the rind or skin from the wood of easy accomplishment; the fine silky filaments will be found adhering to the inside of the rind or skin, and which can be readily separated by the fingers; but this must be done carefully.

*15th Nov.* 1844.—When I wrote you on the 12th instant, I was under the impression, that the "*chittee creeper*," from which I obtained the fibres for making the rope forwarded to you by dâk banghy, was unknown, but on a further perusal of the work from which I obtained the information relative to the *Nerium Indigo*, and which I had only partially looked at previously, I discovered my error. On reading the chapter treating of "Fibres applicable to Cordage," it appears, that the *chittee* had not escaped the penetrating and scientific researches of Dr. Roxburgh, as you will perceive by the following extract:—

"Mr. W. Roxburgh in an excursion among the Rajemahl hills, observed the bowstrings of the natives to be made of a remarkably strong and beautiful fibre. He learnt that these strings usually lasted five years, though in constant use and exposed to all the vicissitudes of the weather. His attention was awakened to the subject, and he was sedulous in his enquiries after the plant which produced this valuable material, uniting strength, durability, and elasticity. He found on examining the plant called *jeetee* by the natives, that it was a species of Asclepias, to which he gave the name of the bowstring creeper.

It is a twining plant with few or no branches, having leaves growing opposite on hairy foot stalks, and at a distance from each other. The fibres are obtained by stripping off the bark from the tender succulent shoots, after they have been exposed to the sun for a day, in order to evaporate a milky juice which exudes from the stalk. The only implements which are then used to cleanse the fibres are the finger nails, and those persons who have been provident enough to keep these very long, expeditiously scrape the pulpy parts away; one man being so provided, being able to cleanse a considerable quantity of fibres in a day. According to Dr. Roxburgh, the fibres of this plant are the strongest of any yet known."*

I should have told you in my last letter, that the *chittee creeper* is cut down the middle, and divided into two pieces after it has been plucked, and before it has been dried or steeped in water; this I suspect makes it more easy to strip off the bark without breaking it.

To James Hume, *Esq.*, *Honorary Secretary, Agricultural and Horticultural Society.*

Bankshall, 31st, December 1844.

My dear Sir,—I have the pleasure to acknowledge the receipt of your note of the 30th November, with which you forwarded a specimen of *jeetee* rope, and requesting, that an experiment might be made of its strength as compared with other rope of similar size.

I now beg to forward to you the result of the experiment, from which it appears, that the specimen sent by you does not support the high character anticipated. On inspection of the sample sent for trial, I am of opinion, that if the yarns had been more easily laid up, the result would have been somewhat different, but not to such an extent as to place it nearly on an equality with rope made from good Europe or Manilla hemp. I shall, however, be happy to make trial of any other specimens you may be able to procure.

Believe me, &c.
T. E. Rogers.

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* Library of Entertaining Knowledge, Vegetable Substances, Vol. 3, Chapter vi, page 106.

### *Report of proof of Balasore or Moorgahvi, Arracan, Deyrah and Jeetee Hemp Rope, "in juxtaposition," with different descriptions of Europe, Manilla, New Zealand, Sunn, and Coir Rope.*

| Description of Rope. | Size of Rope. | Length of Sample. | Rope stretched with weight of scale 455 lbs. | Rope lengthened before breaking. | Weight at which the Rope broke. | Where broken. | Time during which experiment continued. | REMARKS. |
|---|---|---|---|---|---|---|---|---|
| Moorgahvi, .... .... | 2 In. | 6 Ft. | 5 In. | 13 In. | 1175 lbs. | Centre. | 1 Min. | 10 Yarns on a Strand. |
| Ditto, (tarred,) .. ..... | ditto, | ditto, | $3\frac{1}{2}$ do. | $9\frac{1}{2}$ do. | 1063 do. | ditto, | ditto, | Ditto ditto. |
| *Arracan, .... .... | ditto, | 3 ft. 11 in. | 2 do. | 9 do. | 2231 do. | ditto, | ditto, | 12 Ditto ditto. |
| *Deyrah, .... .... | ditto, | 3 do. 10 do. | 3 do. | $7\frac{1}{2}$ do. | 2519 do | Upper splice, | 2 do. | Ditto ditto. |
| Europe, (Patent,) .. .... | ditto, | 6 do. $1\frac{1}{2}$ do. | $2\frac{2}{3}$ do. | $10\frac{1}{3}$ do. | 2655 do. | Centre, | 3 ditto, | 16 Ditto ditto. |
| Ditto, (Fresh,) .. .... | ditto, | 6 do. $1\frac{1}{2}$ do. | $3\frac{1}{2}$ do. | $10\frac{2}{3}$ do. | 2463 do. | ditto, | 3 ditto, | 9 Ditto ditto. |
| Ditto, (twice laid,) .. .... | ditto, | 6 do. $1\frac{1}{2}$ do. | $3\frac{1}{4}$ do. | 7 do. | 1295 do. | ditto, | $1\frac{1}{2}$ do. | 7 Ditto ditto. |
| Ditto, (ditto,) .... .... | ditto, | 6 do. $1\frac{1}{2}$ do. | 3 do. | $8\frac{2}{3}$ do. | 1351 do. | ditto, | $1\frac{1}{2}$ do. | Ditto ditto. |
| Manilla, (plain,) .. .... | ditto, | 6 do. 2 do. | $2\frac{1}{2}$ do. | $11\frac{1}{2}$ do. | 2731 do. | ditto, | 5 ditto, | 8 Ditto ditto. |
| Ditto, (tarred,) .. .... | ditto, | 6 do. | $3\frac{1}{3}$ do. | $13\frac{1}{2}$ do. | 1712 do. | ditto, | 2 ditto, | Ditto ditto. |
| *New Zealand, .. .... | ditto, | 6 do. $1\frac{1}{2}$ do. | 4 do. | $10\frac{1}{2}$ do. | 2591 do. | ditto, | 4 ditto, | 14 Ditto ditto. |
| Sunn, (plain,) .... .... | ditto, | 6 do. | $5\frac{1}{2}$ do. | $17\frac{1}{2}$ do. | 2679 do. | ditto, | $3\frac{1}{2}$ do. | 11 Ditto ditto. |
| Ditto, (tarred,) .. ..... | ditto, | 6 do. | 5 do. | $13\frac{5}{6}$ do. | 2239 do. | ditto, | 3 ditto, | 9 Ditto ditto. |
| Moorgahvi, (plain,) .. .... | $1\frac{1}{2}$ do. | 6 do. 3 do. | $5\frac{1}{2}$ do. | $9\frac{1}{2}$ do. | 875 do. | ditto, | $\frac{1}{2}$ do. | 6 Ditto ditto. |
| Ditto, (tarred,) .. .... | ditto, | 6 do. 1 do. | 6 do. | 10 do. | 711 do. | ditto, | $\frac{1}{4}$ do. | 7 Ditto ditto. |

*Report of Proof of Balasore or Moorgahvi, Arracan, Deyrah, and Jeetee Hemp Rope, "in juxtaposition," with different descriptions of Europe, Manilla, New Zealand, Sunn, and Coir Rope.—(Continued.)*

| Description of Rope. | Size of Rope. | Length of Sample. | Rope stretched with weight of scale 456 lbs. | Rope lengthened before breaking. | Weight at which the Rope broke. | Where broken. | Time during which experiment continued. | Remarks. |
|---|---|---|---|---|---|---|---|---|
| Jeetee, (plain,) .. .... | 1½ In. | 5 ft. 6 in. | 12⅔ In. | 15 In. | 903 lbs. | Centre. | 1 Min, | 4 Yarns on a Strand. |
| Europe, (Patt.,) .. .... | ditto, | 6 do. 1 do. | 4 do. | 10¼ do. | 1743 do. | ditto, | 4 ditto, | 10 Ditto ditto. |
| Ditto, (Fresh,) .. .... | ditto, | 6 do. 1½ do. | 4 do. | 9⅓ do. | 1967 do. | ditto, | 2 ditto, | 7 Ditto ditto. |
| Ditto, (twice laid,) .. .... | ditto, | 6 do. 1 do. | 2½ do. | 6 do. | 1214 do. | ditto, | 1 ditto, | 6 Ditto ditto. |
| Ditto, (ditto,) No. 2, .... | ditto, | 6 do. 3 do. | 3½ do. | 6½ do. | 871 do. | ditto, | 1 ditto, | 5 Ditto ditto. |
| Manilla, (plain,) ... .... | ditto, | 6 do. 1½ do. | 7 do. | 13 do. | 1431 do. | ditto, | 1¼ do. | 5 Ditto ditto. |
| Ditto, (tarred,) .. .... | ditto, | 6 do. 1 do. | 4½ do. | 9 do. | 1463 do. | ditto, | 1 ditto, | 6 Ditto ditto. |
| *New Zealand, (tarred,) .... | ditto, | 6 do. ½ do. | 4 do. | 8 do. | 2231 do. | ditto, | 4 ditto, | 10 Ditto ditto. |
| Sunn, (plain,) .. .... | ditto, | 6 do. | 7 do. | 13½ do. | 1607 do. | ditto, | 1½ do. | 6 Ditto ditto. |
| Ditto, (tarred,) .. .... | ditto, | 6 do. | 5 do. | 11½ do. | 1703 do. | ditto, | 1½ do. | 7 Ditto ditto. |
| Coir, (plain,) .. .... | ditto, | 6 do. 2 do. | | 32 do. | 823 do. | ditto, | 1½ do. | 12 Ditto ditto. |

N. B.—The results in the foregoing Report are the average of three separate experiments with each description of Rope, with exception to those Samples marked with an asterisk (*), of which only one trial was made.

## *Abstract of the foregoing Proof in the order of Strength and Elasticity.*

| | STRENGTH. | | | | ELASTICITY. | | | |
|---|---|---|---|---|---|---|---|---|
| | 2-inch Rope. | | 1½-inch Rope. | | 2-inch Rope. | | 1½-inch Rope. | |
| No. of Sample. | Names. | Weight at which broken. | Names. | Weight at which broken. | Names. | Length stretched before breaking | Names. | Length stretched before breaking |
| | | lbs. | | lbs. | | Inches. | | Inches. |
| 1 | Manilla, (white,) ... | 2731 | New Zealand, ... | 2231 | Sunn, (white,) ... | 17½ | Coir, (plain,) ... | 32 |
| 2 | Sunn, (ditto,) ... | 2679 | Europe, (1839,) ... | 1967 | Ditto, (tarred,) ... | 13⅚ | Jeetee, ... ... | 15 |
| 3 | Europe, (Pat.) ... | 2655 | Ditto, (Pat.) ... | 1743 | Manilla, (tarred.) ... | 13½ | Sunn, (white,) ... | 13½ |
| 4 | New Zealand, ... | 2591 | Sunn, (tarred,) ... | 1703 | Moorgahvi, (white,) | 13 | Manilla, (white,) ... | 13 |
| 5 | Deyrah, ... ... | 2519 | Ditto, (white,) ... | 1607 | Manilla, (white,) ... | 11½ | Sunn, (tarred,) ... | 11½ |
| 6 | Europe (1839,) ... | 2463 | Manilla, (tarred,) ... | 1463 | Europe (1839,) ... | 10⅔ | Europe, (Pat.) ... | 10¼ |
| 7 | Sunn, (tarred,) ... | 2239 | Ditto, (white,) ... | 1431 | New Zealand, ... | 10½ | Moorgahvi, (tarred,) | 10 |
| 8 | Arracan, ... ... | 2231 | Europe, (twice laid,) | 1214 | Europe, (Pat.) ... | 10⅓ | Ditto, (white,) ... | 9½ |
| 9 | Manilla, (tarred,) ... | 1712 | Jeetee, ... ... | 903 | Moorgahvi, (tarred,) | 9½ | Europe, (1839,) ... | 9½ |
| 10 | Europe, (twice laid,) | 1351 | Moorgahvi, (white.) | 875 | Arracan, ... ... | 9 | Manilla, (tarred,) ... | 9 |
| 11 | Ditto ditto,... ... | 1295 | Europe, (twice laid,) | 871 | Europe, (twice laid,) | 8⅔ | New Zealand, ... | 8 |
| 12 | Moorgahvi, (white,) | 1175 | Coir, (plain,) ... | 823 | Deyrah, ... ... | 7½ | Europe, (twice laid,) | 6½ |
| 13 | Ditto, (tarred,) ... | 1063 | Moorgahvi, (tarred,) | 711 | Europe, (twice laid,) | 7 | Ditto ditto,... ... | 6 |

MASTER ATTENDANT'S OFFICE,
*The 20th December*, 1844.

A. B. CLAPPERTON.
*1st Assist. to the Master Attendant.*

## MEMORANDUM.

These results are a portion of an extensive series of experiments undertaken in the year 1840, in compliance with the orders of the Marine Board, contained in Mr. Secretary Greenlaw's letter, No. 175, dated 7th October 1839, to ascertain the strength of rope made from the Moorgahvi hemp, forwarded by Captain Bond from Balasore, in *juxta position* with other description of rope now in use. These experiments were interrupted by the absence of the First Assistant Master Attendant on sick leave, and no report has yet been submitted. A set of trials on a small scale, with reference to the Moorgahvi, was noticed in the Journal [illegible] the Agricultural and Horticultural Society, vol. 3, part 1, page 23, in a correspondence with Lieutenant Colonel Irvine, C.B., Acting Superintendent of Marine.

2d. The samples [illegible] acan and Deyrah hemp were forwarded for experiment by the late Secretary to the Society, Dr Spry, and laid up in 2-inch rope in November 1841; but the experiments were again interrupted by the death of the late Master Attendant, Captain Harington, in that [illegible], and these samples were not submitted for trial till [illegible] 16th December 1844, at the same time, as the small samples of *jeetee*, forwarded by Mr. Hume, the Honorary Secretary.

3rd. It will be seen from the abstract, that amongst the 13 samples of the 2-inch rope, the Deyrah hemp stands the 5th in strength and the 12th in elasticity; the Arracan hemp is 8th in strength and the 10th in elasticity. Amongst the same number of samples of 1½-inch rope, the *jeetee* is the 9th in strength and the 2nd in elasticity, being only surpassed by untarred coir rope; this may possibly be caused by its being laid up by hand. The Moorgahvi, both tarred and white, stands the lowest in the 2-inch rope for strength; the elasticity of the untarred specimen is much greater than that of the tarred, being the 4th and the 9th on the list respectively; the results of the specimen of $1\frac{1}{2}$-inch Moorgahvi are nearly the same.

4th. It is evident that the sample of *jeetee*, forwarded by Mr. Hume, is too small for experiment, and that if a quantity of the hemp or fibre could be procured, so as to be laid up in Calcutta, to the size of from 4 to 2-inches, the trials of strength would be more decisive and satisfactory.

A. B. CLAPPERTON,
*1st Assistant to the Master Attendant.*

*Master Attendant's Office, 30th December,* 1844.

## *Observations on specimens of Sugar, Soils, and Indigo-giving Plants from the Tenasserim coast; communicated by* EDWARD O'RILEY, *Esq. With an analysis of the Soils, by Mr.* J. G. SCOTT, *of the Honorable Company's Dispensary.*

MY DEAR SIR,—I have to tender you many apologies for not noticing your esteemed letter of 27th of June last ere this, but the fact is, that my time has been so much occupied that I could not do so, and at the same time render any information to the Society that might be deemed either interesting or instructive. A few days of leisure, however, afford me the opportunity of thanking you for your kind communication as above, as well as for the arrow-root bulbs, and the favourable reports you enclosed of the sample of sugar I forwarded for report.* You ask "whether the sugar in question was manufactured by the common process, or by that of the vacuum pan." In answer I beg to say, that I have none other but the open pan system in my establishment, and that the sugar in question is the produce of the *common native cane*, which after several trials, at the commencement of my career on this coast, I found to produce a much superior article in *grain* than the other kinds of imported cane, principally Otaheite. Since that period, however, the *foreign* descriptions of the plant have been considerably increased, and from their healthy and hardy appearance during the heat of the dry season, I have great hopes that they have become acclimated; but this shall form the subject of future investigation.

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* The sample of sugar referred to by Mr. O'Riley, was submitted at the general meeting of the Society, on the 10th July, 1844, and the minute of the Members of the Committee was handed in at the same time, expressive of their opinion, that it is an excellent sample of raw Muscavado sugar, of good colour, and that its value (quoted at from 8-8 to 9 Rs. per maund) would be materially enhanced if the molasses could be more extracted without injury to the grain. One member considers it to resemble the strongest Muscavado sugar from the island of Jamaica, and another observes, that in point of granulation and strength, it surpasses any thing he has seen of *Bengal* production, excepting perhaps that of the Dhoba works, and from the Beerbhoom district.

Your remarks on the subject of the Otaheite cane in Tirhoot are very interesting: the same amount of produce, or even more on the average per acre of new soil, on this coast, may be obtained, with the very material point in its favour *of being entirely free from the attacks of white ants*, a subject which appears to oppose very serious obstacles to the extended cultivation of the Otaheite plant in the Upper Provinces. I have given this point a good deal of attention of late, and after a personal inspection of all the Otaheite cane grown in the vicinity, I have not found a single patch injured by the attacks of those insects, notwithstanding the fact of their abounding in the vicinity, and in many cases *literally in the cane fields*, where they may be seen covering the stumps of the trees left after burning the new jungle. It is a singular fact, that I have never heard a complaint made by the native cultivators of the ravages of white ants, not only in regard to the Otaheite cane, but of all the kinds in cultivation. To afford every information in regard to the nature and properties of the soil, the produce of which is exempt from this pest, I have the pleasure of forwarding in charge of Capt. Russell of the *Ganges*, a box of the soil taken from one of the gardens, which is about the average of all the cultivation in this vicinity. In the same box are two paper parcels from Major Macfarquhar, at Tavoy, containing specimens of the soil of his garden, in which he states, "that Otaheite cane has been *growing for the last 5 or 6 years uninjured, although there are legions of white ants in every direction." I trust that an examination of these soils may lead to some data, that may* be useful in guiding future operations in this description of cultivation.

I find that by placing a good layer of common charcoal from the furnaces, under all materials of wood, subject to the ravages of the white ants, they are well-preserved, and in no case have I discovered any damage when this precaution has been taken; perhaps the application of the refuse of the furnaces to the soil, when opening the furrows previous to planting, might be attended with success in this respect; at all events it is worth the trial.

In the same box I forward two specimens of sugar manufactured at Tavoy from the native cane, by the very rude process in use with the natives, which consists of evaporating the juice as it is received from the mill, without the application of temper, or any other assistance in separating the feculence but that of heat; both specimens have been exposed repeatedly during the last protracted S.W. monsoon, and have suffered very little from the moisture of the atmosphere. Major Macfarquhar will feel obliged for an opinion as to the qualities of these musters,* and requests me further to inquire, if you can afford him any information as to the method of protecting mango and other fruit trees from the attacks of the *borers*, which are very destructive at Tavoy.*

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* These musters are valued by the Committee at 6 Rs. and 8 Rs. per maund. They are both considered specimens of excellent strong-grained sugars, and although the colour of both qualities is low, their strength makes them worth the sums above named. One of the members is of opinion, that their values would be considerably enhanced if the molasses principle could have been extracted without injuring the grain, particularly the canister specimen which, in point of granulation, resembles a vacuum-pan sugar.

I have also the pleasure of forwarding by this opportunity, three specimens of indigo-plants in use with the natives of this coast, for the purpose of dyeing their yarn previous to weaving.

*No. 1*† *is the same plant as the one in common use as the cultivated plant of Bengal. It is permitted to grow to its* full size, and the *leaves only* are used for the preparation of indigo, which are taken from the tree several times during the rainy season. Some of the plants attain a thickness of 6 to 8 inches in circumference.

*No. 2*‡ is a *parasitical creeper*, possessing very strong qualities of the dye, which exudes on pressure between the fingers; the natives have no other process of extracting it but by means of lime added in solution to the steeped plant. It is found in the jungles, but not in any large quantity, and may be propagated by cuttings placed against any jungle tree.

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* Huldee or sulphur are stated to be good antidotes to the depredations of the *borer*. If the tree has been attacked by it, the powder should be put in the holes. If unattacked, it would be well to plaster the trunk with a layer of huldee mixed with any kind of oil to make it stick.

† Mr. Griffith thinks that this leguminous plant is an Indigofera.

‡ This Mr. Griffith believes to be the Marsdenia tinctoria, *Brown:* Asclepias tinctoria, *Roxb.* In his History of Sumatra, Marsden alludes to this plant in the following words:—

"There is another kind of Indigo, called in Sumatra *taram akar*, which appears to be peculiar to that country, and was totally unknown to botanists to whom I shewed the leaves upon my return to England in the beginning of the year 1780. The common kind is known to have small pinnated leaves growing on stalks imperfectly ligneous. This on the contrary, is a vine, or climbing plant, with leaves from three to five inches in length, thin, of a dark green, and in the dried state discoloured with blue stains. It yields the same dye as the former sort; they are prepared also in the same manner, and used indiscriminately, no preference being given to the one above the other, as the natives informed me; excepting inasmuch as the *taram akar*, by reason of the largeness of the foliage, yields a greater proportion of sediment. Conceiving it might prove a valuable plant in our colonies, and that it was of importance in the first instance that its identity and class should be accurately ascertained, I procured specimens of its fructification, and deposited them in the rich and extensively useful collection of my friend Sir Joseph Banks. In a paper on the Asclepiadeæ, highly interesting to botanical science, communicated by Mr. Robert Brown, (who has lately explored the vegetable productions of New Holland and other parts of the east,) to the Wernerian Society of Edinburgh, and printed in their Transactions, he has done me the honor of naming the genus to which this plant belongs, Marsdenia, and this particular species *Marsdenia tinctoria*."

*No.* 3* is the indigo plant peculiar to this coast, and in most general use with the natives, who keep small patches near their houses, and make use of the leaves and tops of the plant; its produce is considered superior to No. 2 and equal to No. 1. The plant thrives well in shady spots with a moist soil, and is propagated by slips which thrive exceedingly well, and produce 3 or 4 crops of leaves during the monsoon. If this plant would answer in Bengal, any amount of seedlings required could be obtained from this, and I should feel great pleasure in being instrumental to its introduction.

Roxburgh also (Flora Indica, vol. 2, p. 43,) makes the following remarks regarding the useful properties of this plant:—

"The leaves of this plant yield Indigo, as mentioned by Mr. Marsden, and by Mr. Blake, in the first volume of the Asiatic Researches. I have also extracted it from them by hot water. The few experiments I have yet made do not enable me to say positively in what proportion they yield their colour; but it was of an excellent quality, and as the plant grows very readily from layers, slips, or cuttings, I think it very well worthy of being cultivated; particularly as it is permanent, like the *Nerium*, so that a plantation once formed, will continue for a number of years; and if we are allowed to draw a comparsion between the leaves of this plant, and those of *Nerium tinctorium*, the quantity of colour they may yield will be in a larger proportion than from the common *Indigo* plant.

"Since writing the above I have learned, that this plant is a native of Cooch-bahar, and had some of the plants sent me from thence, also of Pegu, from whence I have likewise received plants.

"Some more experiments I have made with the leaves, confirm what is above related, not only respecting the quality of the Indigo, but also that the proportion is considerably greater than is obtained from *Indigofera tinctoria*. I have therefore warmly recommended an extensive cultivation thereof."

The plant is also alluded to in Low's Dissertation on Penang and Province Wellesley.

* This plant Mr. Griffith recognizes as one of the Indigo-giving Acanthacea, of which little or nothing is known, and he thinks it may be quite new. This genus, he observes, is also found in Assam; it gives a deep indigo, and the Singphos and Kamptees use it largely.

In using the above, the natives content themselves with a deposit from the plant of a thickened dry consistency, so that I am unable to send any specimen of the produce in the cake. I shall endeavour to do so, however, by some future opportunity.

Besides the specimens now sent, there is another kind of indigo plant known to the natives here, which I have not been able to obtain, owing to its being of too tender a nature to bear removal, and it is still some time before it flowers; when this takes place, I will secure some seed, together with seed of the parasite plant, and forward them to you.

I had other subjects to notice by this opportunity, but the approach of the steamer prevents my doing so; you must therefore excuse this crude communication.

*Amherst,* 18*th November,* 1844.

## MEMORANDUM.*

In submitting the results of my analysis of three specimens of soils from the Tenasserim provinces, it is expedient that I make a few preliminary remarks on the condition of those soils, as they were received by me. The two specimens from Major Macfarquhar's garden at Tavoy, were put up in paper parcels, covered with wax cloth. These appear to me to have lost their water of absorption considerably by evaporation, and hence materially affect a correct analysis of these specimens, so far only, however, as their water of absorption is concerned, and on which, so much of the fertility of the soil depends. The sample from Mr. O'Riley, packed in a box, was in a perfect state of preservation.

The object in forwarding these soils, as stated in Mr. O'Riley's communication, is the probability of their analysis leading to some correct data, as to the cause of the produce of the soils being exempt from the attacks of white ants. Mr. O'Riley observes, " your remarks on the subject of the

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* In forwarding this memorandum, Dr. M'Clelland observes, "Mr. Scott has taken very great pains in the analysis, and I fully approve of his remarks."

Otaheite cane in Tirhoot are very interesting. 'The same amount of produce, or even more on the average per acre of new soils on this coast, may be obtained with the very material point in its favor of *being entirely free from the attacks of white ants*, a subject which appears to oppose very serious obstacles to the extended cultivation of the Otaheite plant in the Upper Provinces." He further adds, "to afford every information in regard to the nature and properties of the soil, the produce of which is exempt from this pest, I have the pleasure of forwarding a box of the soil taken from one of the gardens, which is about the average of all the cultivation in this vicinity."

The analysis of the two specimens from Major Macfarquhar, affords nothing which would induce me to select it, as being peculiarly distasteful to white ants. They are simply good siliceous soils, and contain nothing more than such soils do in general.

400 parts of the soil, marked "from the surface," yielded

| | |
|---|---|
| Of water of absorption, ... ... ... ... ... ... | 15 |
| Of loose stones and gravel, principally siliceous, | 47 |
| Of undecompounded vegetable fibres, ... ... | 27 |
| Of fine siliceous sand, ... ... ... ... ... ... | 205 |
| Of minutely divided matter separated by agitation and filtration, and consisting of carbonate of lime, ... ... ... ... ... ... ... ... | 3 |
| Carbonate of magnesia, ... ... ... ... ... ... | 1 |
| Matter destructible by heat, principally vegetable, | 13 |
| Silica, ... ... ... ... ... ... ... ... .. ... | 48 |
| Alumina, ... ... ... ... ... ... ... ... ... | 16 |
| Oxide of iron, ... ... ... ... ... ... ... ... | 4 |
| Soluble matter, principally chloride of sodium and vegetable extract, ... ... ... ... ... ... | 2 |
| Amount of all the products, ... | 381 |
| Loss, ... ... ... ... ... | 19 |

400 parts marked "from a cubit below the surface," yielded

| | |
|---|---|
| Of water of absorption, ... ... ... ... ... | 10 |
| Of loose stones and gravel, principally siliceous, | 45 |
| Of undecompounded vegetable fibres, ... ... | 15 |
| Of fine siliceous sand, ... ... ... ... ... ... | 210 |
| Of minutely divided matter separated by agitation and filtration, and consisting of carbonate of magnesia. ... ... ... ... ... ... ... ... | 2 |
| Carbonate of lime, ... ... ... ... ... ... ... | 6 |
| Matter destructible by heat, principally vegetable, | 20 |
| Silica, ... ... ... ... ... ... .. ... | 50 |
| Alumina, ... ... ... ... ... ... ... ... | 14 |
| Oxide of iron, ... ... ... ... ... ... ... | 5 |
| Soluble matter, principally chloride of sodium and vegetable extract, ... ... ... ... ... | 3 |
| Amount of all the products,... | 380 |
| Loss, ... ... ... ... ... | 20 |

The sample from Mr. O'Riley, is a rich ferruginous soil, highly absorbent and retentive, as will be seen by the loss of its water of absorption, which nearly amounts to 25 per cent. In this soil, I would unhesitatingly point to the large quantity of metallic oxides it contains, as being in my opinion, offensive to insects. It is a fact, I believe known to agriculturists, that the produce of rich ferruginous soils are more or less exempt from them. The subject, however, is both important and interesting, and well worthy of more extended experiments.

400 parts of this soil, yielded

| | |
|---|---|
| Of water of absorption, ... ... ... ... ... ... | 98 |
| Of loose stones and gravel, siliceous, ... ... | 8 |
| Of undecompounded vegetable fibres, ... ... | 2 |
| Of fine siliceous sand, ... ... ... ... ... | 190 |

| | |
|---|---|
| Of minutely divided matter, separated by agitation and filtration, and consisting of carbonate of lime, | 10 |
| Matter destructible by heat, (vegetable,) | 12 |
| Silica, | 40 |
| Alumina, | 14 |
| Oxide of iron, | 12 |
| Oxide of manganese, | 2 |
| Soluble matter, principally chloride of sodium, and vegetable extract, | 2 |
| Amount of all the products,.. | 390 |
| Loss, | 10 |

I would suggest that soils collected for analysis, be preserved in bottles, *quite filled with them*, and closed with ground glass stoppers.

J. G. Scott.

### *Note to Mr.* Sconce's *Paper, page* 203.

"This perhaps is stated too generally,—it was my purpose rather to allude to the use of Salt in the preparation of a native's "salun," that is, his too often meagre stew of vegetables or fish skins rather than fish, eaten with his rice; and to the necessity which the dearness of salt imposes upon a poor man of cooking once a day, and saving the remnants for a second meal."

# Correspondence and Selections.

## FURTHER PARTICULARS CONNECTED WITH THE CULTIVATION OF THE OLIVE, AT THE GOVERNMENT BOTANIC GARDEN AT HEWRA, IN THE DECKAN; WITH NOTICES REGARDING THE GROUND NUT AND CASTOR OILS.

*Communicated by* Dr. Alex. Gibson, *Supt. Govt. Botanic Gardens, Bombay Presidency.*

Hewra, Deckan, 11th November, 1834.

I have been duly favoured with your letter, communicating the resolution of the Committee of the Society of Horticulture of India, requesting me to furnish information regarding the locality, &c. of the olive trees now in the garden here.

In reply, I have the pleasure to acquaint you, for the information of the Society,

1st. That this locality is about 2000 feet above the sea level.

2nd. That the distance from the sea in a direct line is about 70 miles.

3d. That owing to the very open country extending from this to the Ghauts, (distant 20 miles,) the sea breeze is sensibly felt, but from the nature of the soil, the barenness of the country, &c., the quantity of moisture which it adds to the otherwise very dry air is, until early in May, hardly appreciable

4th. The mean of annual temperature may be stated as about 76° Fah. Extremes from 103° to 50° Fah. The former temperature is rare, 92° to 94° being most generally the daily highest rise in the hot season, so that the climate is comparatively temperate.

As to the present state of the olive trees in the garden here, they do not appear to be at all affected by the heat; and as to wood and leaves, are most flourishing. Height may be about 14 feet, but though I have now had them for 3½ years in the garden, they have not yet flowered, though they have been coaxed by ringing, tying the branches, &c.

The numerous side shoots afford stout walking sticks. They are evergreen. From the very succulent and healthy state of the main trunks, I have every hope that they may yet flower.

I think that the tree might have a good chance of success in sheltered valleys of the table land towards the head of the Taptee and Nerbudda rivers, in the vicinity of jungle, so as to afford a climate somewhat *moist.* I do not think that the heavy rains of Bengal, Assam, or of the Tenasserim provinces would suit the tree. I also believe, that the climate of the Agra provinces would, like that of Guzerat, be found too dry and hot in the hot season. Probably the climate of Malwa might suit it better than any.

I will have much pleasure in doing my best to give effect to any resolutions the Society may make as to the further extension of the tree.

*13th November.*—I am very glad to see, that the subject of oils is so actively taken up by your Society.

From what I see of the ground nut oil, (at least that expressed by Bramah's press,) it, as a table oil, is much superior to the olive oil as commonly met with in this country; but that expressed by the common process, has generally an admixture of other oils. This year I have supplied the medical stores, and will probably continue to do so.

The castor oil obtained by the same process differs from the clearest castor oil of the bazars in being quite free from taste. This also, it is likely, I may supply to the stores in future; and, on the whole, I am of opinion, that this oil-press produces oils which will be sought after in the market, when the manufacture shall be conducted on a more extensive scale.

Bearing pillars are however essential to the efficiency of the machine, particularly in pressing those oils which contain much stearine. The plates ought to fit into the bearing pillars, which should be of strong square iron, and rise through holes in the roof of the press.

I will be happy at any time to communicate to the Society any further particulars.

## FURTHER INFORMATION REGARDING THE WHITE LINSEED AND WHEATS OF CENTRAL INDIA.

*Extract of a Letter from Lieutenant Colonel* J. R. OUSELEY, *A. G. G: S. W. Frontier, dated Chota Nagpoor, 16th November,* 1844.

With reference to your letter of the 16th September 1844, regarding white linseed and wheats, I have the pleasure to forward a price current for several years, furnished by the Deputy Commissioner, Captain Spence, who obligingly had it made out for me.

I can only add, that the linseed is sowed at the same time with wheat.

You sow one bushel of linseed in land that would require four bushels of wheat seed; one bushel sowed, should give a return of twenty-four fold to thirty-two fold.

The price current shews best the estimation in which white linseed is held, also the relative value of wheats. Jalalya and Sohalya are synonymous. Ulsee is linseed.

I am convinced that Jalalya wheat would be most prized in England, and if possible, I shall send a small quantity, via Bombay, for the opinions of professional men at home. White linseed is exported towards Bombay, and is to be found at Jubbulpore; but I understand none grows north of Rewah; and from inhabitants of Oude now here, I am informed it is unknown in that territory; it forms an article of trade south of the Nerbudda, and is in great demand.

*Price Current per manee* of 24 rooroos of Gram, Pergunnah Hosshungabad.*

| | WHEAT. | | | | ULSEE. | | |
|---|---|---|---|---|---|---|---|
| Month of March 1835. | Julalya. | Sohalya. | Kutya. | Pissee. | White. | Black or Red. | Tig. |
| | Nag. Rs. As. P. | Nag. Rs. As. P. | Nag. Rs. As. P. | Nag. Rs. As. P. | Nag. Rs. As. P. | Nag. Rs. As. P. | Nag. Rs. As. P. |
| | 6 2 0 | 6 2 0 | 6 0 0 | 5 0 0 | 6 0 0 | 5 0 0 | 5 0 0 |
| 1838, | 5 8 0 | 5 8 0 | 5 0 0 | 4 0 0 | 5 0 0 | 4 0 0 | 5 0 0 |
| 1841, | 4 8 0 | 4 8 0 | 4 0 0 | 4 0 0 | 4 12 0 | 4 0 0 | 4 0 0 |
| 1844, | 3 0 0 | 3 0 0 | 2 8 0 | 2 0 0 | 5 0 0 | 4 0 0 | 4 0 0 |

(True Copy,)
J. R. OUSELEY,
*Agent Govr. Genl. and Commisioner.*

(Signed) H. SPENCE,
*Deputy Commissioner,* 1*st Class.*

*Hoshungabad, Deputy Commissioner's Office, the 29th October,* 1844.

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* 8 paillees make one rooroo, which is equal to 90 [illegible] weight; therefore a manee weighs about 5 maunds and 16 seers, allowing 40 seers to the maund, and 80 tolas to the seer.

## ON THE MODE OF CULTIVATING THE LATAKIA TOBACCO.

*Extract of a letter from Dr.* ALEXANDER GIBSON, *dated Hewra, 13th November,* 1844.

"I beg to apologize for not having sent the accompanying Remarks on the Latakia tobacco before now. The season for sowing is now over, and I will therefore not send any more seed this year."

The seed is sown with us (at Latakia) in March in ground free from stones, and well manured with goat's-dung, and strewn over with prickly bushes to protect the young plants from birds. Water daily till the plants reach the size of 8 or 10 inches, then transplant.

In July the tobacco is gathered, and made into small bundles which are exposed in the sun for some days, and are then hung up in the peasant's huts, and left hanging all the winter for their being fumigated, and thus acquiring the peculiar flavour.

All tobacco cultivated about the Latakia mountains derives its origin from the same seed; but the difference which exists between the qualities of the "*Abouri-tree*" and the other, is owing to the former being cultivated about high mountains, and to its being fumigated with "*gozen*"* and "*sindian;*"† but those fumigated with *gozen* have the best smell.

The fumigation is not resorted to expressly for the tobacco, but owing to our mountaineers in general being obliged to burn much wood in the winter in their huts, which answers both purposes. The smoke improves the tobacco both in colour, smell, and flavour. The other qualities not being fumigated, are yellowish instead of brown, and have never the agreeable smell, &c. of the "*Abouri-tree.*"

(Signed) M. LYONS.

(True Copy,) ALEXANDER GIBSON,
*Supt. Botanic Garden.*

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## REPORT ON THE STATE OF THE AGRICULTURAL AND HORTICULTURAL SOCIETY AT LUCKNOW.

*Extract of a letter from Captain* G. E. HOLLINGS, *dated Lucknow,* 31*st December,* 1844.

"I have the pleasure to forward an account of a Meeting of the Members of our Horticultural Society, which took place on the 30th instant, and it affords me very great satisfaction to attract your notice to the 2nd Resolution, and to request, that you will convey to the Society generally, and accept yourself, the best thanks of the Lucknow Agricultural and Horticultural Society, for the kindness and readiness with which all my applications have been complied with."

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* Pine-wood, which abounds in Syria.

† Probably oak.

*At a general Meeting of the Subscribers to the Horticultural and Agricultural Society at Lucknow, held at the Banquetting Rooms of the Residency, on Monday the 30th December,* 1844.

Present, MAJOR WILCOX,
The REV. MR. CARSHORE,
„ CAPTAIN HOLLINGS,
„ CAPTAIN FRASER, and
„ DR. J. S. LOGIN.
MAJOR WILCOX in the chair

The Secretary having submitted his report of what had been done in the Society's Garden, from the time of his having taken charge of it, and also exhibited a statement of the accounts to the end of the year 1844, shewing a balance in cash of 1,500 : 9 : 11, out of which the current expences of the present month 229 : 9 : 9½, are to be paid, and the sum of Sicca Rs. 2,500 in Government Securities, *it was resolved unanimously*, that as the report is highly satisfactory and the accounts correct, the thanks of the Meeting be offered to the Secretary, Captain George E. Hollings, for his most zealous and unremitting attention to the interests of the Society, and that he be requested to continue his able and efficient services in his present office.

2dly.—It was also resolved, that the recommendation of the Secretary in the last para. of his report be most cordially adopted, and the thanks of the Meeting be conveyed to the President and Members of the Agricultural and Horticultural Society in Calcutta, and to James Hume, Esq. their Secretary.

3dly.—Resolved, that the Secretary's recommendation regarding additional wells, &c., be likewise adopted.

4thly.—It being in the opinion of the Members conducive to the objects of the Society, that periodical exhibitions of fruits and vegetables be held, and prizes be distributed for the best specimens, it *was resolved* that an annual sum of Rupees 120 be appropriated from the funds of the Society for the same, and that the Secretary be requested to invite Subscribers in aid of this object. The time of holding the exhibition to be determined by the Secretary, who will give twenty days' previous notice of the same, in order that native gardeners in the city and cantonments may be duly aware of it.

5thly.—That a supply of English flower and vegetable seeds be annually ordered from England, in order that a succession of vegetable crops may be secured; the amount for the purchase and transmission of the same to be for the present limited to £15 per annum. R. Wilcox, *Chairman.*

On Major Wilcox leaving the chair, it was unanimously voted, that the thanks of the Meeting be given to the Chairman.

G. E. Hollings, *Secretary.*

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### *Report regarding the state of the Agricultural and Horticultural Society at Lucknow, submitted to a General Meeting of the Members, assembled on the 30th December,* 1844.

As I have had charge of the Public Garden at Lucknow for nearly two years and a half, it is necessary that I should submit for your consideration, as full a report as I can prepare of all that has been done during that period, and the practical result which is shewn in the accounts now submitted for your approval. You are well aware, that at the time I accepted the office of Secretary, a large portion of the funds so liberally given by His Majesty the King of Oude, and subscribed by Colonel Low, C. B. then Resident, and the original contributors, had been expended in laying out the grounds, and in useful experiments; and I found the sum of three thousand Rs. in Government Securities, a subscription of one hundred Rs. a month from His Majesty the King of Oude, and the contributions of the subscribers, at the rate of 32 Rs. each annually as the only certain resources; to which ought to be added a little more than four hundred Rs. a-year rent for a portion of the garden which was regularly farmed out; for the year previous to that in which I took charge the products yielded seventy-two Rs. four Annas and ten and three-quarter of a Pie a month, whilst the whole expences amounted on an average to Rs. 226 : 4 : 11 per mensem.

Under the impression, that land cannot be profitably cultivated in any part of the world without the employment of capital, I directed my first efforts to the proper cultivation of vegetables and fruits, the sale of which from the local demand would be profitable, and I laid out the gains in renewing the stock. The accounts submitted with this report will show, how many young bullocks have been purchased to replace old and unserviceable ones; what new carts have been bought; what old ones repaired; what implements of agriculture have been renewed. The Darogah's house and corresponding one for the accommodation of occasional visitors have been thoroughly repaired; many out-offices, which were indispensably necessary, built, and others, as well as the bullock-sheds, re-roofed; the extensive wall round the garden, and the different wells have been always kept in repair, and several new puckah drains for the conveyance of water constructed.

By a prudent foresight in laying in supplies of grain and bhoosah, the cattle have been fed at a much less expence than formerly; whilst the rate received for every article of produce, has far exceeded what could possibly have been contemplated.

If I had intended to claim any credit to myself from the improved condition of the garden, I would have refrained from attracting your attention to the details of what has been done, and have contented myself with allowing the accounts to be my vouchers; but I consider it an act of justice to give the credit where it is due; viz. to the native Darogah who by always attending to the orders he has received, and devoting the energies of an honest and intelligent mind to the performance of his duties; by giving me the advantage of his experience in all matters connected with the purchase of materials; the proper periods for laying supplies of grain &c.; the most fitting opportunities for buying cattle, &c.; and by his active and untiring exertions as a superintendent, has been the real cause of the great improvement in the prospects of the garden.

If we may judge from what has occurred, we have only made a good commencement; the cold ingratitude of the soil has been overcome by a generous application of manure, and by agricultural industry; there is no reason to suppose, that even any great progress has been made, on the contrary we may fairly conclude, that by a continuance of the system that has now been established, the resources of the garden will yearly increase, and that with an improved knowledge of agriculture gained by experience, we shall eventually be able fully to carry out the object for the attainment of which the garden was originally established; namely, the dissemination throughout Oude of the most valuable seeds of every kind of produce, and the communication of the manner in which they can be best and most profitably cultivated. It will be seen that during last year, I was obliged to reduce the permanent funds by the sale of five hundred Rupees of the Government paper belonging to the garden; the surplus in hand will admit of that sum being repaid, and I have no fear of being again obliged to indent on the capital. To meet a temporary emergency, I thought it expedient to sell some of the valuable graft mangoe trees of three and four years of age, the value of which has been redeemed by the number of grafts taken during the last two years; the establishment of nurseries for seedling fruit trees of every description; the value of the vines from seed brought by Sir Wm. Nott from Cabool, and from the grapes sold in boxes; and the numerous grafts from guava, orange, and other trees now in the garden. A considerable quantity of good arable ground has been recovered by the sale and cutting down of country mangoe trees which, as regards our objects, were neither ornamental nor useful. The surplus profits have enabled me to pay some attention to floriculture, and I feel convinced, that the introduction of the cultivation of English, American, and Cape flowers must be agreeable to you. I venture to recommend to your attention, or rather solicit your sanction to the expenditure of money sufficient to dig two or three new wells, and the payment of the extra number of bullocks and establishment to ensure their being efficiently worked, under a full conviction, that eventually the increased produce will more than indemnify us for the present expence.

The accounts submitted to you so fully explain the result of what has been done during the time that I have had charge of the garden, that I consider it unnecessary to offer any comments on them; but I cannot conclude this report without asking you to join me in thanking the Agricultural and Horticultural Society in Calcutta, and their able and most obliging Secretary, for the kindness and readiness with which all my applications have been complied with; which I am sure you will do most readily, when you hear, that all the best vegetables at present growing in the garden, have been produced from seeds sent from Calcutta.

G. E. HOLLINGS, *Secretary*.

*Statement shewing the Receipts and Expenditure of the Horticultural Society's Garden at Lucknow, from 20th December* 1840 *to* 31*st December* 1843.

| Months. | 1841. | | | | | Remarks. |
|---|---|---|---|---|---|---|
| | Amount received from the Treasury. | Amount received for sale of the productions. | Amount received from the cultivators. | Total. | Amount expended. | |
| From 20th December, 1840 to January, 1841, ... ... | 0 0 0 | 148 7 10 | 128 0 0 | 276 7 10 | *399 5 4 | * Including two months' pay of servants. |
| February, ... ... ... | 200 0 0 | 28 11 0 | 96 0 0 | 324 11 0 | 214 3 6 | |
| March, ... ... ... ... | 0 0 0 | 9 9 0 | 54 8 0 | 64 1 0 | 191 1 0 | |
| April, ... ... ... ... | 200 0 0 | 16 4 9 | 51 14 9 | 268 3 6 | 241 7 6 | |
| May, ... ... ... ... | 200 0 0 | 135 4 3 | 42 14 3 | 378 2 6 | 214 9 3 | |
| June, ... ... ... ... | 0 0 0 | 316 13 3 | 20 15 0 | 337 12 3 | 270 1 9 | |
| July, ... ... ... ... | 0 0 0 | 22 2 9 | 1 0 0 | 23 2 9 | 162 9 9 | |
| August, ... ... ... ... | 200 0 0 | 20 0 9½ | 0 0 0 | 220 0 9½ | 159 12 6 | |
| September, ... ... ... | 200 0 0 | 34 1 2½ | 0 0 0 | 234 1 2½ | 157 14 3 | |
| October, ... ... ... ... | 0 0 0 | 33 7 0 | 42 0 0 | 75 7 0 | 324 13 1 | |
| November, ... ... ... | 200 0 0 | 59 4 3 | 0 0 0 | 259 4 3 | 172 14 6 | |
| December, ... ... ... | 200 0 0 | 43 8 9 | 0 0 0 | 243 8 9 | 206 14 6 | |
| Total, Rs. ...... | 1,400 0 0 | 867 10 10 | 437 4 0 | 2,704 14 10 | 2,715 10 11 | |

G. E. Hollings, *Secretary.*

*Statement shewing the Receipts and Expenditure of the Horticultural Society's Garden at Lucknow, from* 20*th December* 1840 *to* 31*st December* 1843.—*(Continued.)*

| Months. | 1842. | | | | | | | | | | | | | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Amount received from the Treasury. | | | Amount received for sale of the productions. | | | Amount received from the cultivators. | | | Total. | | | Amount expended. | | | |
| January, ... ... ... ... | 0 | 0 | 0 | 27 | 14 | 3 | 50 | 0 | 0 | 77 | 14 | 3 | 190 | 2 | 0½ | |
| February, ... ... ... ... | 200 | 0 | 0 | 0 | 7 | 6 | 0 | 0 | 0 | 200 | 7 | 6 | 194 | 14 | 0 | |
| March, ... ... ... ... | 200 | 0 | 0 | 4 | 0 | 0 | 46 | 0 | 0 | 250 | 0 | 0 | 200 | 3 | 3 | |
| April, ... ... ... ... | 200 | 0 | 0 | 129 | 10 | 3 | 0 | 0 | 0 | 329 | 10 | 3 | 310 | 5 | 6 | |
| May, ... ... ... ... | 0 | 0 | 0 | 80 | 8 | 0 | 47 | 0 | 0 | 127 | 8 | 0 | 184 | 12 | 0 | |
| June, ... ... ... ... | 200 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 212 | 0 | 0 | 177 | 10 | 6 | |
| July, ... ... ... ... | 200 | 0 | 0 | 266 | 0 | 0 | 0 | 0 | 0 | 466 | 0 | 0 | 239 | 12 | 0 | |
| August, ... ... ... ... | 0 | 0 | 0 | 18 | 5 | 3 | 0 | 0 | 0 | 18 | 5 | 3 | 177 | 0 | 6 | |
| September, ... ... ... ... | 200 | 0 | 0 | 60 | 11 | 3 | 0 | 0 | 0 | 260 | 11 | 3 | 321 | 2 | 9 | |
| October, ... ... ... ... | 0 | 0 | 0 | 134 | 14 | 6 | 0 | 0 | 0 | 134 | 14 | 6 | 247 | 13 | 10 | |
| November, ... ... ... ... | 200 | 0 | 0 | 61 | 15 | 0 | 70 | 0 | 0 | 331 | 15 | 0 | 511 | 14 | 1 | |
| December, ... ... ... ... | 400 | 0 | 0 | 32 | 5 | 10 | 6 | 0 | 0 | 438 | 5 | 10 | 274 | 3 | 0½ | |
| Total, Rs ...... | 1,800 | 0 | 0 | 828 | 11 | 10 | 219 | 0 | 0 | 2,847 | 11 | 10 | 3,029 | 13 | 6 | |

G. E. Hollings, *Secretary.*

*Statement shewing the Receipts and Expenditure of the Horticultural Society's Garden at Lucknow, from 20th December 1840 to 31st December 1843.—(Continued.)*

| Months. | 1843. | | | | | | | | | | | | | | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Amount received from the Treasury. | | | Amount received from sale of the plantations. | | | Amount received from the cultivators. | | | Total. | | | Amount expended. | | | |
| January, ... ... ... ... | 300 | 0 | 0 | 40 | 12 | 0 | 72 | 0 | 0 | 412 | 12 | 0 | 349 | 1 | 4 | |
| February, ... ... ... ... | 250 | 0 | 0 | 21 | 9 | 0 | 7 | 0 | 0 | 278 | 9 | 0 | 341 | 7 | 8½ | |
| March, ... ... ... .. | 191 | 15 | 0 | 57 | 12 | 6 | 101 | 0 | 0 | 350 | 11 | 6 | 349 | 12 | 6 | |
| April, ... ... ... ... | 190 | 5 | 9½ | 196 | 12 | 2 | 85 | 8 | 0 | 472 | 9 | 11½ | 339 | 1 | 7 | |
| May, ... ... ... ... | 316 | 13 | 5 | 121 | 14 | 3 | 0 | 0 | 0 | 438 | 11 | 8 | 422 | 9 | 8 | |
| June, ... ... ... ... | 40 | 11 | 5 | 158 | 3 | 9 | 100 | 0 | 0 | 298 | 15 | 2 | 655 | 12 | 2½ | |
| July, ... ... ... ... | 350 | 0 | 0 | 374 | 5 | 6 | 0 | 0 | 0 | 724 | 5 | 6 | 282 | 0 | 4 | |
| August, ... ... ... ... | 0 | 0 | 0 | 270 | 8 | 9 | 100 | 0 | 0 | 370 | 8 | 9 | 222 | 9 | 10 | |
| September, ... ... ... ... | 0 | 0 | 0 | 3 | 3 | 6 | 24 | 12 | 0 | 27 | 15 | 6 | 249 | 14 | 9 | |
| October, ... ... ... ... | 200 | 0 | 0 | 101 | 4 | 0 | 0 | 0 | 0 | 301 | 4 | 0 | 352 | 11 | 2 | |
| November, ... ... ... ... | 0 | 0 | 0 | 37 | 1 | 9 | 0 | 0 | 0 | 37 | 1 | 9 | 274 | 11 | 9 | In 1843 there were about 600 Rs. received for Bombay mangoe grafts. |
| December, ... ... ... ... | 300 | 0 | 0 | 48 | 7 | 6 | 0 | 0 | 0 | 348 | 7 | 6 | 393 | 15 | 3 | |
| Total, Rs....... | 2,139 | 13 | 7½ | 1,431 | 14 | 8 | 490 | 4 | 0 | 4,062 | 0 | 3½ | 4,233 | 12 | 1 | |

G. E. Hollings, *Secretary.*

*Statement Sewing the receipts and Expenditure of the Horticultural Society's Garden at Lucknow from 20th December 1840 to 31st December 1843.—(continued.)*

| Months. | 1844. | | | | | REMARKS. |
|---|---|---|---|---|---|---|
| | Amount received from the Treasury. | Amount received for sale of the productions. | Amount received from the cultivators. | Total. | Amount expended. | |
| January, ... ... ... ... | 200 0 0 | 53 1 4 | 0 0 0 | 253 1 4 | 270 5 6 | |
| February, ... ... ... ... | 0 0 0 | 111 7 6 | 74 0 0 | 185 7 6 | 326 11 0 | |
| March, ... ... ... ... | 500 0 0 | 166 6 0 | 0 0 0 | 666 6 0 | 334 8 10 | |
| April, ... ... ... ... | 190 7 1½ | 274 6 2 | 32 9 0 | 497 6 3½ | 445 9 8 | |
| May, ... ... ... ... | 198 0 10½ | 336 10 11 | 68 11 0 | 603 6 9½ | 397 0 4 | |
| June, ... ... ... ... | 196 0 0 | 409 4 4 | 0 0 0 | 605 4 4 | 565 4 10½ | |
| July, ... ... ... ... | 0 0 0 | 50 7 3 | 0 0 0 | 50 7 3 | 304 10 6½ | |
| August, ... ... ... ... | 200 0 0 | *301 7 9 | 0 0 0 | 501 7 9 | 245 14 10½ | * Including price of country mangoe trees sold.<br>† Ditto ditto. |
| September, ... ... ... ... | 61 14 10 | †220 4 4½ | 0 0 0 | 282 3 2½ | 378 8 4 | |
| October, ... ... ... ... | 0 0 0 | 273 10 7½ | 0 0 0 | 273 10 7½ | 308 13 10½ | |
| November, ... ... ... ... | 0 0 0 | 151 15 9 | 100 0 0 | 251 15 9 | 289 14 11 | |
| December, ... ... ... ... | 0 0 0 | 233 14 6 | 0 0 0 | 233 14 6 | 403 1 9 | |
| Total, Rs....... | 1,546 6 10 | 2,583 0 6 | 275 4 0 | 4,404 11 4 | 4,270 8 7 | |

G. E. HOLLINGS, *Secretary.*

*Abstract.*

| | 1841. | 1842. | 1843. | 1844. |
|---|---|---|---|---|
| Drawn from the Treasury, ... ... | 1,400 0 0 | 1,800 0 0 | 2,139 13 7½ | 1,546 6 10 |
| Sale of Produce, ... ... ... ... | 867 10 10 | 828 11 10 | 1,431 14 8 | 2,583 0 6 |
| Amount received from Cultivators, ... | 437 4 0 | 219 0 0 | 490 4 0 | 275 4 0 |
| Total, ...... | 2.704 14 10 | 2,847 11 10 | 4,062 0 3½ | 4,404 11 4 |
| Amount Expended, ...... | 2,715 10 11 | 3,029 13 6 | 4,233 12 1 | 4,270 8 7 |
| Average Monthly sale of Products, ... | 72 4 10¾ | 69 0 11¾ | 119 5 2½ | 215 4 0½ |
| Average Monthly expences, ... ... | 226 4 11 | 252 7 9½ | 352 13 0 | 355 13 4½ |

Purchase of cattle, buildings, repairs of wells, walls, &c. &c. are included under the head sundry expences.

Sundry expences. 1842,—— 239 13 9
" 1843,—— 714 7 4
" 1844,—— 531 6 6
Total,... 1,485·11 7

G. E. Hollings, *Secretary.*

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ESTABLISHMENT OF AN HORTICULTURAL SOCIETY AT SIMLA.

James Hume, Esq., *Honorary Secretary, Agri-Horticultural Society.*

My dear Sir,—I have very great pleasure in forwarding the Proceedings of the new Horticultural Society of Simla.

From a communication with Dr. MacGregor of Sabathoo, who has been remarkable for his success in raising a great number of the choicest flowers from seeds received Overland, I entertain the hope, that another Horticultural Society will be established there, in connection with that of Simla. Sabathoo is not near so elevated, the temperature 10 degrees less, and the rains not so heavy as they are here, consequently there are many kinds of flower and fruit plants which will succeed at Sabathoo, which could not be reared at the great elevation of Simla.

Believe me, &c.

FREDERICK CORBYN.

*Simla, Dec.* 11, 1844.

### *Proceedings of a Meeting convened at Simla on the 30th September,* 1844, *for the purpose of considering the propriety of establishing a Horticultural Society and Gardens at the Station.*

The Honorable J. C. ERSKINE, Sub-Commissioner, in the chair.

RESOLVED.

1st.—That the rapidly increasing demand for fruits and vegetables at Simla being evident, and the inferior quality of those grown in the neighbourhood and bought at the bazars, much and justly complained of, it be deemed expedient at this meeting that measures should be taken to increase the supply, and improve the quality of those necessary articles of consumption.

2d.—That to attain these ends, the formation of a Horticultural Society, supported by voluntary subscription, is desirable; and that it be attempted to form one. For this purpose those, whose names are attached hereto, agree to become Members and supporters of the said Society.

3d.—That it be determined, that the first objects of the Society be those which are likely to be of the greatest utility, and therefore that its earliest efforts be directed to the formation of a nursery; this *nursery* to be principally devoted to the raising of fruit trees and vegetable seeds for distribution; first among the Subscribers; and secondly among those native gardeners and cultivators who may be most likely to supply the station bazars with their produce.

4th.—That for the purpose of immediately testing the prospect there is of improving in the climate of Simla the vegetables most in demand, a piece of the Nursery ground be set aside as a Kitchen garden during the ensuing year. The produce of the kitchen garden to be sent to the centre bazar of the station, and sold for the benefit of the Society's Funds.

5th.—That as the culture of flowers constitutes a pursuit equally harmless and attractive, and one as well suited to amuse and occupy the invalid as to engage the attention of the healthy and more active, the next object of the Society shall be the formation of one or more flower gardens, on condition that the Funds prove sufficient for the purpose after the expenses of the nursery and kitchen garden have been provided for.

6th.—That the affairs of the Society be managed by a Committee, chosen from among the permanent residents and annual visitors of the station, to be elected half-yearly, on or about the 15th days of April and September of each year.

7th.—That to give the proposed Society a present substantial existence, a Committee of Management be now chosen, and granted full power to receive subscriptions, to select and either purchase or hire on lease, as may be most expedient and practicable, a piece of ground in some suitable situation, to entertain an establishment, and to purchase tools, seeds, or whatever else they may consider necessary for the proper construction of the proposed nursery and garden, being guided in their proceedings by the amount of funds which may be contributed, and the present and prospective demands upon them.

8th.—That the below named gentlemen be requested to take upon themselves the duties of the first Managing Committee, and for the purpose of obviating any inconvenience that might attend a return to the plains or occasional absence of any of the members, that they be allowed to add to their number whenever they may consider such a measure likely to promote the efficiency of their operations.

9th.—That the Committee be requested to put themselves in communication with the *Agri-Horticultural Society of Calcutta*, and solicit permission to consider the *Simla Horticultural Society* as an auxiliary branch of that institution.

10th.—That the Committee be requested to address the non-resident possessors of Simla property, and ask their assistance in promoting the interests of the Society, &c. &c.

*Members of the Committee.*

The Honorable John C. Erskine,
Major General T. P. Smith,
Colonel Chadwick,
F. Corbyn, Esq.
B. Hodgson, Esq.
Major Boileau,
—— Farrington,
—— T. Scott,
Robt. Hay, Esq.
—— Carte, Esq.
H. T. Tapp, Esq.

(Signed) John C. Erskine,
*Chairman.*

## CULTURE OF FOREIGN COTTON, AND OTHER PRODUCTS AT RUNGPORE.

*Extract of a letter from* H. Rehling, *Esq., dated Bhetgarra, 24th October,* 1844.

"I have now the pleasure to inform you, that I have by to-day's dâk bangy forwarded to your address, a small parcel, containing cotton,* raised from the acclimated New Orleans seed you kindly supplied me with. It is the first cotton I have picked, and as the color might be objected to, I beg to remark that the cotton has been picked after very bad weather; when an opportunity offers I shall do myself the pleasure to send you another sample, in a larger quantity, and I hope of a better quality too. Knowing nothing of cotton, I can of course not form any opinion as to the quality of the cotton, but to judge from the plants I have now on the ground, I should say, this district is remarkably well adapted to the culture of this important staple. Some of the plants on the high lands are literally groaning under the weight of the bowls, which I am sorry to say are subject to the puncture of worms, which circumstance either causes the bowls to fall off, or the cotton is injured in color and quality. It is to be regretted, that no public spirit has been evinced by European residents for agricultural improvements in this district, for which purpose it is by nature so highly gifted for I consider Rungpore, one of the richest and best cultivated districts in Bengal; the soil retains its moisture the whole year round, the months of March and April excepted, when they are generally relieved by refreshing showers; sugar-canes, tobacco, oil seeds, wheat and other grains, ginger and turmeric, and mulberry plants for silk worms, are articles which are extensively cultivated in this district, and that without irrigation, the process of which is entirely unknown to ryots here, who otherwise pay a great deal of attention to their cultivation, and the only thing that is requisite is to introduce an improved mode of cultivation amongst them, and to supply them with superior seeds. I propose to devote my humble efforts for the above purpose, and crave the aid of the Society in supplying me with seeds and plants of useful productions. I have secured about 40 biggahs of land in the neighbourhood of this place, which I intend to turn into a nursery garden for useful products, and I will particularly turn my attention to the introduction of the superior specimens of sugar-canes, foreign cotton, grains, and all kinds of useful tubers."

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* These musters, the produce of New Orleans seed, acclimated at the Government farm at Coimbatore, is thus reported on by a Member of the Committee :—

"The Cotton is a fair specimen of the acclimated seed cotton. It is soft, tolerably strong and of fair colour, but the staple or fibre appears to me not of so good a length as we witness usually in this description grown in Lower Bengal. It is somewhat curled or wiry: these defects arise probably from a want of sufficient care or attention in the cultivation, and which could be remedied. The cotton too has been planted at the wrong season which, in Bengal, I think should be during August and September, not later, so as to be enabled to gather in the dry months, when there will be less chance of the bowls being injured by the red worm, and of the wool being discolored."

## MODE OF RAISING LAVENDER FROM SEED.

*Extract of a letter from* F. NICOL, *Esq., dated Chandpore, Jessore,* 11*th December,* 1844.

"Your note of the 23d ultimo, with a small packet of Lavender seed, I have to acknowledge with thanks. I have managed to get the Lavender to germinate this year. My plan is, to place a piece of blanket over the seed, which I sowed in rich ground filled into a gumlah, which I set in the sun, and throw water on the blanket morning and evening; this has succeeded;—it remains however to be seen, whether I shall be able to rear the plant.

The Cape seeds received from the Society have all proved good this year, not a single failure.* The great pity is, that they did not arrive sooner, as I fear the hot weather will set in before the vegetables can arrive to perfection."

## ON THE CONVEYANCE OF PLANTS AND SEEDS ON SHIP-BOARD.

*(From a lately published work on the growth of plants in glazed cases. By* N. B. WARD, F. L. S.)

Numerous have been the methods employed in the conveyance of plants to and from distant countries. It is quite unnecessary, however, to enter into any lengthened account of these attempts, as they resolve themselves into two kinds;—the one where the plants are meant to be kept in a passive condition; and the other where means are employed to keep them growing during the voyage.

The best method of keeping plants in a state of rest is the one generally employed, and, I believe, first recommended by Messrs. Loddiges, viz.—the packing them in successive layers of bog-moss *(Sphagnum)*, which answers very well for the majority of deciduous trees and shrubs and other plants, when dispatched at the termination of their active season. For the package of Cactuses and other succulent plants, Messrs. Loddiges recommend the driest sand, all vegetable matters being injurious.

But by far the greater number of plants require to be kept growing during the voyage; and prior to the introduction of the glazed cases, a large majority of these plants perished from the variations of temperature to which they were subjected,—from being too much or too little watered,—from the spray of the sea,—or, when protected from this spray, from the exclusion of light. The venerable Menzies informed me that, on his return from his last voyage round the world with Vancouver, he lost the whole of his plants from this latter cause. Again, if the voyage lasts longer than usual and the water runs short, it is not every one who has the care of plants that will imitate the example of the patriotic M. de Clieux, who, in 1717, took charge of several plants of coffee that were sent to Martinico, and approved himself worthy of the trust. The voyage being long and the weather unfavourable, they all died but one ; and the whole ship's company being at length reduced to short allowance of water, this zealous patriot divided his own share between himself and the plant committed to his care, and happily succeeded in carrying it safe to Martinico, where it flourished, and was the parent stock whence the neighbouring islands were supplied.

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* Several other communications regarding the goodness of the Cape seeds have reached the Society.

When I reflected upon the above causes of failure, it was obvious that my new method offered a ready means of obviating all these difficulties, so far at least as regarded ferns, and plants growing in similar situations; and in the beginning of June, 1833, I filled two cases with ferns, grasses, &c., and sent them to Sydney under the care of my zealous friend Capt. Mallard, whose reports on their arrival will be found in the Appendix.*

The cases were refilled at Sydney in the month of February, 1834, the thermometer then being between 90° and 100°. In their passage to England they encountered very varying temperatures. The thermometer fell to 20° in rounding Cape Horn, and the decks were covered a foot deep with snow. At Rio Janeiro the thermometer rose to 100°, and in crossing the line to 120°. In the month of November, eight months after their departure, they arrived in the British Channel, the thermometer then being as low as 40°. These plants were placed upon the deck during the whole voyage and were not once watered, yet on their arrival at docks they were in the most healthy and vigorous condition ; and I shall not readily forget the delight expressed by Mr. George Loddiges, who accompanied me on board, at the beautiful appearance of the fronds of *Gleichenia microphylla*, a plant never before introduced alive into this country. Several plants of *Callicoma serrata* had sprung up from seed during the voyage, and were in a very healthy state.

* These reports, as also some other interesting correspondence "on the growth of plants without open exposure to air," are published in the Transactions of the Agricultural and Horticultural Society of India, vol. 4.—Eds.

My next experiment was with plants of a higher order. Ibrahim Pacha, being desirous of procuring useful and ornamental plants for his garden near Cairo, and at Damascus, I was requested by his agents to select them, and they were sent out in August, 1834, in the Nile steamer, to Alexandria. They arrived quite healthy after a passage of two months.* On a subsequent occasion a case-full of coffee plants was dispatched with the like successful result. It is needless to particularize any more instances, as Messrs. Loddiges† have sent out more than four hundred cases to all parts of the world, with uniform success when the proper conditions were observed; and I believe that the plan, where known, is universally adopted. The French and the English Governments have moreover ordered these cases to be used in their expeditions of discovery; and there are few, I imagine, who will now imitate the ill-timed economy of Mons. Guillemin, who was sent by the Minister of Agriculture and Commerce at Paris, to Brazil, for the purpose of obtaining information respecting the culture and preparation of the tea-plant, and the introduction of this shrub into France. Mons. G. had personal knowledge of the efficacy of the closed plan, having carried out Camellias to Rio in one of my cases; and he says that his first plan had been to construct boxes on Mr. Ward's system, but the heavy price‡ deterred him; while the safety with which he had brought his fruit-trees§ from Europe, in a box with sliding panels, induced him to fix finally on this latter mode of construction.

The results I will give in his own words.—" Very pleasing was the sight to me, when, the day after the Heroine had sailed, (May the 20th, 1839), I beheld my eighteen precious boxes arranged two and two in such a situation as kept them steady and level, permitted them to receive light, and to have the moveable panels closed in bad weather. The vigour of my tea-plants, and the lovely verdure of their foliage, had been generally admired at Rio, and I fondly anticipated the most prosperous results from my expedition. But short-lived was this satisfaction. Two days after heavy north winds drove us off our course, the sea became more boisterous than is usual in these latitudes, and the necessity for closing the ports, lest the spray should irrevocably ruin my plants, caused them a great injury by the necessary exclusion of light. To the latter circumstance I attribute the first deterioration o my plants, especially those more recently set. When the sea became calmer, and permitted us to open the portholes, the wind sweeping the surface of the waves cast a fine salt-water spray upon my boxes, which doubtless proved highly injurious, since the contents of those chests that were exposed to the wind suffered much more than those of the other side. By the 11th of June most of the teas had lost their foliage, and the stalks even of several had quite dried up. Some of the seeds had germinated; the young shoots were slender, long, blanched, and furnished with a few pale leaves. By the 2nd of July, in latitudes 24° north and longitude 42° west, the strongest shrubs were suffering most severely, while some had sent out suckers, and the young seedlings had assumed a greener tint. Capt. Cecille took great interest in the safety of my protégés, and, while the leakage of some of the water-casks had compelled him to put the whole ship's crew on a slender allowance of water, he ordered me an increased quantity for the benefit of the tea-shrubs. The vessel arrived at Brest on the 24th of July, only two months after their departure from Rio, and the shrubs reached Paris in the latter end of August, reduced to 1500 in number, about one-third of the original stock, including young seedlings."* This narrative requires no comment. I believe that not one of the plants would have perished in so short a voyage, had they been protected by glass.

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* Vide Appendix, D. † Vide Appendix, G.

‡ The cost of glazing the whole of Mons. G.'s cases would not have exceeded £20.

§ Had Mons. G. reflected for one moment upon the different states of the fruit trees and o the tea-plants,—the former being conveyed at the close, and the latter at the commencemen of their active season,—he would not, I think, have acted so unwisely.

Although all persons interested in this matter are pretty well acquainted with the cases in which plants are usually sent on voyages, it may not be amiss to say a word or two respecting them. In preparing them for the voyage some little attention is requisite. The objects to be attained are, to admit light freely to all parts of the growing plant, and to make them sufficiently tight to retain the moisture within and to exclude the salt water from without. To effect the latter purpose the glazed frames should be well painted and puttied some time before they are required for use. The lower part of the case, which contains the mould, need not be more than 6 or 8 inches in depth; and the plants succeed better if planted in the soil, than in separate small boxes, as in the former case the moisture is more uniformly diffused. The soil should be that in which the plants ordinarily grow, and especial care should be taken that all superfluous moisture should be drained off, as luxuriance of growth is not to be desired. Another point worthy of great attention is to associate plants of equal or nearly equal rapidity of growth. Thus Palms and coniferous plants will travel well together. In a case which arrived at Loddiges, three or four years ago, there were twenty-eight plants of *Araucaria excelsa* without a single dead or yellow leaf upon them. If, in this case, some free-growing plant had been introduced, the probability is that all the Pines would have perished, in consequence of the rampant plant occupying all the interval surface of the glass, and excluding the light from the others. A great number of plants will travel well in these cases, if *merely suspended from the roof,—such as numerous species of Orchideæ, Cactuses, and other succulent plants.*

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* I am indebted for this account to Hooker's 'Journal of Botany.'

*When on board, all the care which is requisite is to keep the plants* constantly in the light, to remove incrustations of salt or dirt, and immediately to repair any damage done to the glass, either with fresh glass, if on board, or with tin or wood.

Although I have stated, and truly, that plants in these cases will bear great variations of temperature with impunity, it does not follow that all plants will bear long continued severe cold. Care should therefore be taken that all tropical plants should be despatched so as to arrive in this country in warm weather. It has not unfrequently happened that cases full of precious plants, which have reached the Land's End (Cornwall) in a vigorous condition, after a voyage of several months, have perished from the length of time occupied in beating up Channel in the depth of winter.

With respect to the conveyance of seeds. All those which from their oily nature, peculiarity of constitution, or from any other cause, do not long retain their vegetative properties, are best sown in the mould as soon as they are ripe, and will travel int his way with perfect safety, either among other plants or in cases by themselves. Thus a great number of plants of *Seaforthia nobilis* were introduced into England, by seeds sown in the cases in New Holland; and I am certain that all the fine timber trees and *Coniferæ* of the Himalaya mountains might thus easily be imported into this country.

As to other seeds, the plan which is now found to be the most successful having been published more than seventy years ago by the celebrated John Ellis, I cannot do better than detail it in the words of the author, and I am induced to do so for two reasons,—to render my subject more complete, and to do justice to the memory of a great man, whose clear account has been so strangely overlooked by modern writers.

"Our seedsmen are much distressed for a proper method to keep their seeds sound and in a state of vegetation, through long voyages. Complaints are made, that when the seeds arrive in the East Indies, and often in the West Indies, few of them grow, but the most of them are full of insects, or what they term weevilly.

"This seems to proceed from the damp and putrid heat of the hold, or too long confinement in close warm air, which brings these animals to life, which soon begin to prey on the inside of these seeds; and those seeds which are oily turn rancid. The putrid penetating steam that strikes every one upon opening *the hatches of a full loaded ship's hold, after a long voyage,—it is this that does the mischief to seeds. This vapour, as the exellent Dr. Hales observes, will soon become fatal to* vegetable substances, as well as animals.

"When the cavalry of our army in Germany was under the necessity of being supplied with hay from England, the difference was but too manifest between the hay which had been but a month on board, and fresh hay that had never been confined in the hold of a ship.

"Experiments have been made on the best hemp from Russia, and hemp of English growth, by persons belonging to the navy of great credit and honour, and the difference in the strength is amazing; the length of the voyage from Russia, with the very close package that is necessary to stow that article on board, raises such a heat as to show evident signs of putrefaction begun, which must weaken the strongest vegetable fibre.

"To illustrate this further, in an instance of the different manner of packing and stowing seeds for a long voyage, which has lately come to my knowledge, and may be of use, as it not only points out the error, but, in some measure, how to avoid it.

"A gentleman going to Bencoolen, in the island of Sumatra, had a mind to furnish himself with an assortment of seeds for a kitchen-garden; these were accordingly packed up in boxes and casks, and stowed with other goods in the hold of the ship. When he arrived at Bencoolen he sowed his seeds, but soon found, to his great mortification, that they were all spoiled, for none of them came up. Convinced that it must be owing to the heat of the ship's hold, and their long confinement in putrid air, and having occasion to return to England, he determined in his next voyage thither to pack them up in such a manner, and to place them so, as to give them as much air as he could, without the danger of exposing them to salt-water; and therefore put the smaller seeds into separate papers, and placed them among some clean straw in a small close net, and hung it up in his cabin; and the larger ones he put into boxes, stowing them where the free air could come at them and blow through them; the effect was, that as soon as he arrived at Bencoolen, he sowed them, and in a little time found, to his great satisfaction, that they all grew extremely well. It is well known to our seedsmen that, even here at home, seeds kept in close warehouses and laid up in heaps frequently spoil, unless they are often sifted and exposed to the air. Seeds saved in moist cold summers, as their juices are too watery, and the substance of their kernels not sufficiently hardened to due ripeness, are by no means fit for exportation to warmer climates.

"Our acorns, unless ripened by a warm summer, will not keep long in England: those acorns which are brought from America, and arrive early in the year, generally come in good order, owing to their juices being better concocted by the heat of their summer; and are not apt to shrivel, when exposed to the sun, as ours are.

"These hints are given to show how necessary it is to take care that the seeds we send should be perfectly ripe and dry."*

## (D.)

*Copy of a Letter from Mr.* Traill, *to the Author.*

Cairo, April 30, 1835.

Sir,—I beg to acknowledge the receipt of your letter of the 2nd ult., wherein you request information as to the state of the plants sent by you in the Nile steamer.† The collection consisted, I believe, of 173 species, contained in six glazed cases, two of which only were forwarded to me from Alexandria. The one which you mention as having been fitted up with talc, together with three others, were sent on to Syria‡ immediately on their arrival in Alexandria, so that I had no opportunity of seeing them. I have, however, the pleasure to inform you that the Egyptian portion of the collection was received here in the very best condition: the plants, when removed from the cases, did not appear to have suffered in the slightest degree; they were in a perfectly fresh and vigorous state, and, in fact, hardly a leaf had been lost during their passage. Your plan, I think decidedly a good one, and ought to be made generally known.

I am, Sir, &c. &c.

J. Traill.

*To N. B. Ward, Esq.*

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* 'Directions for Captains of Ships, Sea-Surgeons, and other curious persons who collect Seeds and Plants in distant countries, in what manner to preserve them fit for vegetation.'—*John Ellis, London*, 1770.

† In August 1834.

‡ These cases were seen by Col. Higgins of the Engineers, in the garden of the Seraglio, at Beyrout, at the late evacuation of that place by the Egyptians.

*List of Plants contained in the two cases sent to Egypt.*

Achras Sapota.
Adenoropium panduræfolium.
Aleurites moluccana.
Alphinia nutans.
Anona Cherimolia.
Arenga saccharifera.
Bignonia venusta.
Bombax Gossypium.
Brexia spinosa.
Calathea zebrina.
Caryota urens.
Cedrela odorata.
Cinnamomum aromaticum.
Cinnamomum zeylanicum.
Combretum comosum.
Croton variegatum.
Curcuma longa.
Cycas revoluta.
Dalbergia scandens.
Diospyros cordifolia.
Diospyros edulis.
Diospyros Embryopteris.
Doryanthes excelsa.
Dracæna edulis.
Dracæna ferrea.
Erythrina crista-galli.
Eugenia Pimenta.
Euphoria Litchi.
Ficus elastica.
Flacourtia cataphracta.
Franciscea uniflora.
Jonesia pinnata.
Ixora coccinea.
Latania borbonica.
Maranta arundinacea.
Maranta bicolor.
Melastoma Fothergilla.
Menispermum Cocculus.
Melaleuca Cajuputi.
Mimusops Elengi.
Morus tinctoria.
Oreodoxia regia.
Pandanus odoratissimus.
Passiflora racemosa.
Piper Betle.
Piper nigrum.
Psidium chinense.
Terminalia angustifolia.
Uvaria odoratissima.
Vanilla planifolia.
Zingiber officinale.

## (G.)

*Copy of a Letter from* G. Loddiges, *Esq., to the Author.*

Hackney, February 18, 1842.

My dear Sir,—In reply to your enquiries respecting the importation of living plants in your cases, I beg leave to say that my brother and I have, since 1835, made trial of more than 500 cases to and from various parts of the globe, with great variety of success; but have uniformly found, wherever your own directions were strictly attended to,—that is, when the cases were kept the whole voyage in the full exposure to the light, upon deck, and care taken to repair the glass immediately in cases of accident,—the plants have arrived in good condition; but we have never found this so well attended to as in those cases with which we have been favoured by your friends, and particularly by Capt. Mallard, of the Kinnear; indeed amongst all we have sent out or received, none have arrived in such good order as those brought by this gentleman. I wish we had more that possessed his love for Natural History, and would take the same care which he has done, as we should not then have to deplore the number of importations totally ruined, even in your cases, simply for the want of the light of day, and these too under the care of captains who engage that *they shall be kept upon deck, when the moment we are out of sight they stow them away below, and they are never more thought of until their arrival: from experience in this mode of transportation* we are enabled perfectly to see by their state whether they have been placed properly or not; for we find that there cannot be a worse mode of sending living plants, than in these same cases, so placed in the dark. Some of the cases have been [illegible] after voyages of upwards of eight months: in short, nothing more appears to wanting to ensure success in the importation of plants, than to place them in these boxes properly moistened, and to allow them the full benefit of light during the voyage.

I remain, My dear Sir,
Ever yours most sincerely,
George Loddiges.

*To N. B. Ward, Esq.*

## *On the Yellow Colour of the Barberry, and its uses in the Arts.* By E. Solly, Esq.

Having learnt, whilst engaged in inquiries amongst manufacturers and other practical men, that the root of the common Barberry, or Berberis vulgaris, was an article of increasing value in the arts, on account of the fine yellow colour which it contains, and that a new source of this dye stuff was rather a desideratum; I was led to inquire in how far the root in question could be advantageously obtained from India.

The most important use to which the colouring matter is applied, is, as I am informed by a gentleman well acquainted with the arts of dyeing, for the purpose of dyeing or staining leather yellow; for which purpose it is found peculiarly well suited.

The colouring principle is found in the bark and wood of the stem as well as in the root. But the root only has, I believe, been applied in dyeing. In the specimens which I have seen, the colouring matter was in the stem for the most part collected together in the bark, and round the circumference; a considerable portion, also, was deposited round the pith, particularly in the larger stems; whilst the great bulk of the woody fibre intervening, contained very little colour. The root, however, was wholly of a fine yellow colour.

The gentleman before mentioned (and to whom I am indebted for much useful information on this subject) informs me, that the barberry he has seen was generally in large straight pieces, having a somewhat honeycomb cellular structure, and that the colour was generally collected together as it were in masses.

In the larger stems, the proportion of useless woody fibre to the bark and parts yielding colour, is undoubtedly large, but this is quite compensated by the superior richness of colour in the old stems.

According to some experiments of MM. Buchner and Herberger, which are detailed in the *Journal de Pharmacie*, the root of the Berberis vulgaris contains rather more than 17 per cent. of yellow colouring matter, which is entirely soluble in hot water, and to which the name of Berberite has been applied. The root, besides this, contains gum and many other substances, but it is the berberite alone which is available for the purposes of the dyer.*

Few natural orders are more widely distributed than the Berberideæ, for they are found in most temperate parts of the globe: species are found in most of the countries of Europe, and extend, as De Candolle has observed, from Candia to Christiania. In Asia, they are, perhaps, even more widely diffused and abundant. The best known varieties of Asiatic barberries are:—

1. *Berberis Sibirica.* A small shrub, found on the lower mountains and rocky hills of Altaic Siberia.
2. *Berberis Sinensis,* which abounds in China, and the northern parts of India.
3. *Berberis Wallichiana.* A native of Nepal.
4. *Berberis floribunda.* This plant, which is common in the whole of the north of India, was formerly thought by Dr. Wallich to be identical with Berberis aristata; it is now, however, known to be different.
5. *Berberis Asiatica.* Abundant in Nepal and Kumaoon; and according to De Candolle, the Berberis tinctoria, which flourishes in the Neelgherries, is identical with this species.

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This colour has been long used in Astrachan and Poland as a dye for leather, and in some parts of Germany for staining wood of a bright yellow colour.

6. *Berberis aristata*, perhaps the most widely diffused of all these species; it abounds in the mountains of Northern India, and extends from the Himalaya mountains to the Neelgherries, and as far south as Nuera Ellia, and Adam's Peak in Ceylon. It has been described in the *Botanical Magazine* under the name of Berberis chitra; it is, however, not the same as the Chitria of Nepal, which is another variety of Berberis.

Many of these species live for a long series of years, and attain very considerable size; according to Dr. Royle, Berberis Nepalensis, a most beautiful species, which inhabits the mountainous districts in the north of India, grows in shady places to the height of 12 feet at elevations of from 5 to 6,000 feet above the level of the sea; and M. Leschenault de La Tour states, that the Berberis tinctoria, which flourishes in the Neelgherries, and is there known by the name of Jakalow, attains a height of even 20 feet.

These different species of Berberis are employed by the natives in the districts where they abound, in medicine, and as a dye; and the fruit of some are dried and used as an article of food. The late General T. Hardwicke, in his Narrative of a Journey to Sirinagur, published in the *Asiatic Researches*, relates that a variety of Berberis is abundant in the valley through which the Koa Nullah has its course; the fruit of this variety is eaten by the natives, and the wood, which is of a bright yellow colour, is used by them for dyeing; but from the imperfection of their processes the colour so obtained is not permanent. Dr. Royle, in his *Illustrations of the Botany and Natural History of the Himalaya Mountains*, says, when describing the properties and uses of the Berbarideæ, "The root and wood of one species, the Berberis aristata, being of a dark yellow colour, and forming the Dar Huld of Persian writers, are used as a dye; and being bitter and a little astringent, are, together with the bark, employed in medicine. The variety of Berberis found in the Neelgherries, and which M. Leschenault de La Tour calls Berberis tinctoria, from the use to which it has been applied, has by the experiments of M. Vauquelin, been found to be inferior to few woods, for dyeing a yellow colour." There being fortunately preserved in the Museum of this Society, a small quantity of barberry root, which had been sent from Ceylon, together with other specimens of dye woods, &c., I have been enabled to make some experiments with its colouring matter, the result of which proved that it was quite as abundant in the Asiatic as in the European barberry; and on comparing it with some root from Cologne, I found that the colour from the Asiatic was even finer and more brilliant;

and from some experiments in dyeing cotton and silk with it, I have no doubt that it will be found, if not superior, at least quite equal, to the very best which has hitherto been obtained from Cologne, Hamburg, and some other European towns.

Experiments should be made as to the relative quantity and quality of colour contained in the old and young trees, and in their wood, bark, and roots respectively, and likewise as to the best time for collecting them.

As the root contains only about 17 per cent. of useful colouring matter, and the remainder consists of woody fibre and other matters not useful to the dyers, it is important to inquire into the possibility of substituting for the wood or root a watery extract of them. This would contain the whole of the colouring matter, and whilst it would present it in a condensed and convenient form, would of course greatly diminish the expense of carriage and freight, and, in consequence reduce the ultimate cost of the colour.

It is evident that there would be no great difficulty to prevent this being done, for the natives prepare extracts with great success, and have considerable experience in such operations, as we see from a number of Indian extracts, such as Cutch, and Terra Japonica, which have lately become important articles of trade. But there would be far less difficulty in obtaining the extract of barberry, than that of many other trees, for the natives have long made and used it themselves as a medicine, and it is described in the Asiatic books on Materia Medica, under the names of Rusot, Hoozis, and Huzuz. There can therefore be no difficulty in obtaining the article in any quantity which may be required.

It has long been remarked, as a curious circumstance, that Dioscorides has made no mention of the barberry, which from its wide diffusion, and remarkable properties, could hardly escape the attention of the early naturalists. This has, however, been explained by Dr. Royle, who has adduced the most unexceptionable evidence to prove that the Lycium of the ancients, or Λύκιον of the Greeks, was really identical with the Hoozis of the present day, and was, in fact, an extract of barberry. A very interesting confirmation of this will be found in Avicenna, who, when speaking of Lycium, says it is the extract of Al-Feluzahargi, and Dr. Royle, in his paper on Lycium, informs us, that the Persian name of Rusot, the extract of barberry, is Feelzurch.

Some little confusion is caused by the term Dar Huld, or yellow wood, being applied to more than one plant; thus, among many others, Playfair, in his translation of the *Talif Sherif*, describes Dar Huld as turmeric, and says, "it is pungent, bitter, hot, and dry," a description *applicable to turmeric, but not at all to barberry, which is usually described as bitter, cooling, and slightly astringent: and Dr. Royle informs us, that in the north of India Dar Huld signifies barberry, and* that on asking to see the plant yielding Dar Huld and Rusot, species of Berberis were pointed out; whilst in the south of India it is only applied to turmeric.—*From the Journal of the Royal Asiatic Society of G. Britain and Ireland, No.* XIII.

## *Experiments on the Dhak Gond, a natural Exudation of the Butea Frondosa. By* Mr. E. Solly, Jun.

This substance, which although it differs in some particulars from the Kino which is found in the shops, yet as it agrees in its most important properties with what has so long been described under that name, it is most convenient to call it *Butea Kino.*

It is of a brilliant ruby red colour, transparent, and very brittle. It consists principally of small round tears, and other fragments, which from their form appear to have been detached from the lesser branches of the tree. When it has been kept for some time, it becomes opaque and dark coloured, this however may be prevented, according to Dr. Roxburgh, by preserving it in well-closed bottles. I have examined two specimens of this substance, one brought over by Mr. Beckett, and the other received from Bombay. There was considerable difference between the two, but from their properties it was evident that they had been originally similar. The following description is equally applicable to both specimens, except where it is otherwise stated.

When exposed to heat, the Butea kino swells up, emits fumes which are partially inflammable, and then ignites; if after that it is removed from the source of heat, it continues to glow like tinder, until nearly wholly consumed, a very small portion of a white ash only remaining. Ten grains of the kino, carefully selected as to purity, were ignited in a covered platinum vessel, and retained at a red heat until all the carbonaceous matters were burnt; there then remained 0.45 grains of white ash, a very small portion of which was soluble in acids with effervescence, the remainder consisted principally of silica and alumina. The specimens of Butea kino were far from being in a state of purity, being mingled with small fragments of wood, bark, and also with earthy impurities: these were evidently derived from the mode of collection, which most probably consisted in gathering from the ground under the trees the fragments of the natural exudations which had fallen from them. The impurities in the specimen brought over by Mr. Beckett varied from 12 to 25 per cent., of which from 4 to 6 were earthy; *that from Bombay contained in general far more impurities.*

*It swells and slowly dissolves in the mouth, having a pure, strong* astringent taste, like the finer kinds of catechu. It has no smell. In cold water it swells, and slowly imparts to it its fine red colour; after some time only the outer portions of the kino remain, which by exposure to the air had become dark coloured and almost insoluble in water, whilst the whole of the interior and unaltered kino is dissolved. These insoluble portions consist principally of difficultly soluble extractive. A sufficient quantity of boiling water dissolves the whole, and on slowly evaporating the solution, the difficultly soluble extractive separates in tough red films.* The quantity of this extractive of course varies considerably in the two specimens, and influences their solubility. The Bombay variety is far less easily soluble in water, and clear solutions are much more difficult to obtain when made with hot water; they are very apt to become turbid, and if strong, gelatinise on cooling; and if the water contained any saline or earthy substances, this was almost certain to take place. From these circumstances it is rendered very probable that the sample from Bombay had been exposed to the air for a longer time than the other; it was most likely collected at another period of the year, after having remained exposed to the air, damp, and light, for some time. From the description of the properties of the exudation when fresh, and only just become hard, as given by Dr. Roxburgh, in 17—, it is evident that it should be only collected at that period, as it is then far more applicable to useful purposes, whether in medicine or the arts, than after exposure to the air, &c. Both alcohol and pyroligneous spirit dissolve a considerable portion of the Butea kino, but far less than water. Ether dissolves but little, and remains colourless; when a portion of ether is agitated with a strong aqueous solution it soon becomes thick, and, on evaporation, yields a considerable portion of tannin.

A small quantity of persulphate of iron changes the colour of the aqueous solution to a dirty green; a rather larger quantity occasions a copious green precipitate.

A series of experiments were made on the effects of various reagents on solutions of this kino, with a view to ascertain which were the best precipitates of the red colour, ether for dyeing, or as a pigment.

Solutions of most acids, and acid salts, changed the colours to a light orange, and for the most part occasioned copious precipitates; they were nearly all of a dirty yellow or orange colour.

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* This also takes place with the kino of the shops.

When a few drops of a strong solution of caustic potassa were added to the aqueous solution of the kino, the colour was immediately altered, and very much improved, becoming of the most splendid crimson; when however a little more of the solution of potassa was added, the colour rapidly became gray, and a copious precipitate fell. It very quickly became dark reddish gray, and nearly the whole of the colour was destroyed. Caustic soda and ammonia likewise improved the colour in the same way. When acids were added to solutions thus precipitated, so as just to neutralise the alkali, some of the precipitate redissolved, and the rest became orange. Carbonates of potassa and soda both very much deepened the colour of the solution: it was however not to be compared in beauty of colour with the solution obtained by the addition of a small quantity of caustic potassa, and had a slight brown tinge. In general most saline solutions occasioned precipitates which were either pink, gray, or colours between the two. Acetate of lead, as well as several other metallic solutions, precipitated the whole of the colouring matter. The precipitate obtained by adding a solution of alum either to a neutral solution, or to one containing a small quantity of alkali, was of a dirty pink colour. When gelatinous or recently precipitated alumina was agitated with any of the highly coloured solutions, it soon abstracted all the colouring matter, but the lake so formed was, like those formed by precipitation, of a dingy colour. The precipitates formed by metallic solutions were of very variable hues, but in no case were the colours so obtained decided or brilliant. Attempts were likewise made to fix the colour in the fibre of cotton, silk, wool, &c., in various ways, and with different mordants; the colours were all imperfect, dingy, and variable in colour, but they were very permanent. This agrees with the results obtained by Dr. Roxburgh, but as his experiments were made on the fresh substance, they were under more favourable circumstances. The cause why these colours cannot be well employed is, that the red colouring matter is so intimately combined with the tannin and gum, that whenever the one is precipitated, it carries down the other also, and hence, when we endeavour to precipitate the tannin alone, the red colour or extractive is always precipitated with it: this, as will presently appear, is in some cases a great inconvenience.

A solution of gelatine produced in aqueous solutions of the Butea kino, an abundant precipitate of tanno-gelatine, which always contained a portion of colouring matter: this varied very considerably between the two portions of kino, that from Bombay containing by far the most: when a solution of the kino from Mr. Beckett, either in cold water, or still better in alcohol was precipitated, the tanno-gelatine contained very little colour. The solution, after the separation of the precipitate, contained gum, extractive, gallic acid, and minute portions of other matters: the quantity of gallic acid was very various, but in no case did it appear to exist in any considerable proportion.

It was difficult to ascertain the exact per centage of tannin, as it varied very much in different specimens submitted to examination. I have therefore repeated the experiments on several portions, and shall now give the mean of some of the best results obtained.

One hundred parts of the rough kino from Mr. Beckett were dried for 6 hours at a temperature of about 130° Fahrenheit; they lost 13-23 parts of water. Much of this water was derived from the wood, bark, and impurities, for the pure substance when separated was far less hygrometric. The kino thus dried was digested in water kept nearly at the boiling point, until a strong solution was made; this was then poured off, and the process repeated with fresh portions of water, until all the matters soluble in that fluid had been thus removed. The residual matters, consisting only of impurities, weighed 17 parts. The solutions were then rapidly evaporated to a considerable degree of concentration, during which 3-5 parts of difficultly soluble extractive fell down. It was necessary to complete this evaporation as rapidly as possible, because if the hot solution was long exposed to the air, it became much darker coloured and was somewhat altered in properties. The solution was then precipitated by a strong solution of gelatine, of which 28.3 parts were employed. The precipitate, when collected, washed, and carefully dried, weighed 79 parts; by subtracting from this the weight of the gelatine employed, the proportion of matter precipitable by animal jelly is ascertained to be 50.7. This was of course principally tannin, but it contained a portion of coloured extractive which gave to it a dark colour, varying in depth with the circumstances under which the solution was made, &c. The remainder of the solution, after the separation of the tannin, was evaporated; it contained gum, a small quantity of gallic acid, extractive, and minute traces of saline and earthy matters, weighing in all 15 parts. The Bombay kino contained less tannin and rather more gallic acid and extractive, and by long continued boiling with free access of air, the composition of either kind might be easily modified. If this substance were to be employed in the arts, it would be very probably most convenient to obtain it as an extract, unless by so doing it became much darker in colour. By dissolving the tannin by cold water, I have obtained extracts in which the per centage of tannin was as high as 75°, and sometimes even higher; but these extracts were made under the most favourable circumstances, being prepared with rapidity and the least possible exposure to the air. It would be utterly impossible to manufacture the extract in the large *way in this manner, if the causes above mentioned do not prevent it, but it might very probably be advantageous to prepare the kino of the* Butea as an extract, as the cost of freight would be therefore less.

From the large per centage of tannin which this substance contains, as indicated by the above experiments, and from its probable cheapness, it promises to be of considerable value in the arts, and especially in that of tanning leather. As a substitute for the astringent substance now in use, its adoption in many cases from convenience or economy are self-evident, and require no comments; but in the art of tanning leather so many points require to be considered, that it is necessary to say a few words on that subject. On putting a piece of pelt or prepared skin into a strong solution, it soon absorbed a considerable quantity of tannin, but, at the same time, became of a rather dark colour; this is an unfortunate quality, because, as the consumers of leather judge of its quality in part from its colour, the tanners do not like employing anything which deepens the colour too much. The colour taken up by the leather of course varied with the solution employed, a cold solution of the kino from Mr. Beckett giving a much lighter coloured leather than a hot-made solution; that from Bombay gave a darker colour, and the solution was very subject to gelatinise and become turbid; this of course would be a great inconvenience. The leather tanned with this kino was very hard and rather brittle, but it was tanned with considerable rapidity. These results were obtained on small pieces of thin skin, and I do not anticipate that it will answer at all for tanning such skins: its richness in tannin, however promises well for tanning thick hides; and the results of experiments on its application to this process, now in progress, will be communicated on a future occasion.—*Ibid.*

# Monthly Proceedings of the Society.

(*Wednesday, the* 11*th December,* 1844.)

C. K. Robison, Esq., Vice President, in the chair.

The minutes of the last general meeting were read and confirmed.

### *Members Elected.*

The gentlemen proposed at the November Meeting were duly elected Members of the Society; viz.

Messrs. J. G. Llewelyn, E. V. Irwin, and Charles Macleod.

### *Candidates for Election.*

The names of the following gentlemen were submitted as candidates for election :—

Lieut. E. H. Impey, Assistant Commissioner, Tenasserim Provinces,—proposed by Mr. Edward O'Riley, seconded by the Secretary.

Baboo Hullodhur Bhose, Merchant, Calcutta,—proposed by Dr. Huffnagle, seconded by Mr. Balfour.

Charles Sutherland, Esq. Moulmein,—proposed by Mr. W. G. Rose, seconded by Mr. Wm. Storm.

G. B. Robinson, Esq. (Messrs. Boyd, Beeby, and Co.),—proposed by Mr. W. Storm, seconded by Dr. Huffnagle.

### *Presentations to the Library.*

1. Journal of the Asiatic Society of Bengal, Nos. 64 and 65. —*Presented by the Society.*

2. The India Journal of Medical and Physical Science, No. 11, of vol. 2.—*Presented by the Proprietor.*

### Garden and Museum.

1.—A small supply of Nepaul Munjeet Seed.—*Presented by Major H. M. Lawrence.*

2.—A few bulbs of a plant which grows in the island of Chedooba, and specimen of powder prepared therefrom; also specimens of Arrow-root bulbs and powder.—*Presented by Major D. Williams.*

Major Williams mentions that the farinaceous food prepared from the above bulbs is equal, if not superior, to that prepared from *the Arrow-root. The powder sent by Major Williams was prepared* under his own superintendence after the manner the Mugs prepare it for exportation to the Eastward, chiefly, he believes, to the China market. The Arrow-root, Major Williams adds, grows all over Arracan, and is eaten as a vegetable.

The Secretary stated, that so far as his enquiries extended, this bulb is unknown in Calcutta and its vicinity. He had requested Major Williams to send a few of the plants and a larger quantity of bulbs, for culture in the Society's garden, and would endeavour, in the meantime, to obtain a report on the quality of the powder, in comparison with that of the Arrow-root.

3.—Sundry samples of Cotton grown at different places in the Dacca district, from American seed distributed by Mr. Price.—*Forwarded by the Government of Bengal for report.*

4.—Two musters of Sugar, three specimens of soils, and three indigo-giving plants, all from the Tenasserim coast.—*Presented by Edward O'Riley, Esq.*

### *Improvements at the Garden, and proposed extension thereof; Otaheite Cane; Fruit tree Nursery; Experiments with Manures, &c.*

A long report was brought up from the Garden Committee. The Committee intimate the completion of the long pucka walk through the garden, and the progress making in trenching about 15 begahs of ground. They allude to the demand this season for Otaheite cane having far exceeded the supply, and mention the means they have adopted to meet a probably large demand next year. They refer also to the proposed Orchard, which is to comprise a piece of ground of about 15 begahs, extending from the eastern to the present western boundary of the garden, and from the new road to within a few yards of the north boundary; and suggest that application for fruit trees be made to five other localities than those named in a former report. The Committee annex a statement regarding the experiments with manures, which were suggested by Sir Lawrence Peel, from which it would appear that the plots manured with cow-dung have given a far better produce than any other article; oil cake comes second in the list; Penang and Peruvian guano the third; and tank earth the last. In regard to the guano, however, the Committee express a doubt as to the quantity employed being sufficiently large, and suggest another trial with about double the quantity. The Committee likewise suggest, that a portion of the supply of guano presented by Mr. W. P. Grant, be distributed among the members, on the understanding that applicants communicate the result of their experiments to the Society. The Committee conclude their report with a recommendation that the Government be solicited to grant an extension of ground to the Society, for various reasons therein detailed.

Proposed by Dr. Huffnagle, seconded by Mr. Haworth, and resolved, that the Report of the Committee in all its parts be confirmed, and that an extract of the latter portion be sent to Dr. Wallich, Supt. of the Botanic Garden, with a request, that he will address Government on the subject of the proposed additional grant of ground.

### *Floricultural Exhibition.*

Another report was submitted by the Garden Committee, annexing a schedule of prizes, amounting to 150 Rs., to be awarded from Sir Lawrence Peel's quarterly donation, for the first floricultural exhibition for 1845, and suggesting, with reference to the season being so backward for annuals, that the show be delayed till the latter end of January or early part of February.

The Committee recommend that a preference be given at this show to plants in pots, and that due notice be given that, at future shows all the indigenous plants be exhibited in this manner, as also all others of small size. Further, that at this and all other exhibitions, all specimens be kept distinct from one another;—dahlias in one vase, heart's-ease in another, a collection of passifloras in another, and so on. The Committee also recommend, that the schedule of prizes and conditions be printed in English and Bengalee, and distributed to all applicants, due notice of the same being given in the newspapers and bazars.

With reference to the question referred for their consideration, as regards the admission of the produce of private gardens, the Committee conceive that, taking into account that exhibitions of this *nature are yet in their infancy, it is desirable, at any rate for the present,* that the *malees* of private gardens be allowed to compete, in common with other gardeners.

Proposed by Mr. Colin Campbell, seconded by Mr. W. Haworth, and resolved, that this report be confirmed, and that the exhibition be held on the 29th of January.

### *Horticultural Exhibition and Anniversary Dinner.*

A report from the Fruit and Kitchen Garden Committee was next read. The Committee submit a schedule of prizes, amounting to 126 Rupees and 4 silver medals, for the first quarterly exhibition of vegetables and fruits for 1845. The Committee subjoin a memorandum of the amount that has been disbursed for prizes during 1844, and request that the sum of 400 Rupees, inclusive of the cost of medals, be allowed for the next year.

Proposed by Mr. Haworth, seconded by Mr. Campbell, and resolved, that the sum of 400 Rupees be placed at the disposal of the Committee; that the exhibition be held on the 15th January, and the annual dinner on the evening of the same day.

### *Sugar Duty Question.*

The Secretary placed on the table the minutes of the members of the Special Committee, who were appointed at the October meeting, to take into consideration the subject matter of a letter from Mr. Sconce on the above question, and mentioned, that although some delay had occurred, the Committee hoped to lay their report before the Society at its next meeting.

### *The Patron of the Society.*

The Secretary intimated to the Meeting, that in accordance with the Society's request, the President had communicated with the Right Honorable the Governor General with respect to the Patronship of the Society, and that His Excellency had expressed his readiness to accept of the office.

### *Provision for Garden and Flower Seeds for* 1845.

The Secretary submitted an estimate of the probable amount requisite for the consigments of garden and flower seeds for the next year, amounting to Rs. 3,450.

Resolved, that this sum be voted, and that the Fruit and Kitchen Garden Committee be requested to arrange the details.

### *Introduction of Carolina Paddy into Arracan.*

The following communication from Government, forwarding an application from Major Bogle, the Commissioner of Arracan, for a supply of Carolina paddy for cultivation in that province, was next read.

*To the Honorary Secretary, Agricultural and Horticultural Society.*
Revenue.

Sir,—I am directed by the Right Honorable the Governor of Bengal to append copy of a letter from the Commissioner of Arracan, dated the 11th instant, applying for a quantity of Carolina paddy seed, as to the expediency and best mode of supplying which His Excellency will be happy to be favoured with the views of the Society.

I have the honor, &c.,
C. Beadon,
*Under-Secy. to the Govt. of Bengal.*

*Fort William, 27th November,* 1844.

The Secretary stated, that on receipt of the above letter, he had placed himself in communication with Mr. Wm. Haworth on the subject (as he had on several previous occasions taken much interest in the introduction of Carolina paddy into India,) who suggested a reference to some of the firms connected with the regular trading vessels between Boston and this port. He had now the pleasure in pursuance of that suggestion, to submit a letter from Messrs. Smith, Huffnagle and Balfour, agreeing to execute the order of Government in the most handsome manner, asking for their re-imbursement merely the actual cost and charges defrayed by them.

*Resolved*, that a copy of this letter be forwarded to Government.

### *Communications on various subjects.*

The following papers were likewise submitted :—

1.—From Cecil Beadon, Esq., Under-Secretary Government of Bengal, forwarding for the Society's report, the samples of Dacca grown cotton alluded to among the presentations, and submitting further reports by Mr. Price, and certain correspondence on the subject of the proposed experimental Cotton Farms in the Dacca district.

2.—From Col. J. R. Ouseley, forwarding a price current from the Hoosungabad district, of wheats and linseed (red and white,) for several years past, (which has been furnished him by the Deputy Commissioner, Capt. Spence,) and offering some remarks thereon.

3.—From Dr. Gibson, giving in reply to the Society's application, a few particulars regarding the temperature of Hewra, its distance from the Sea, &c., and the condition of the olive plants which he established at the Botanic Garden at that place about 3½ years ago.

4.—From Capt. Goodwyn, submitting a report on the piece of Arracan teak presented at the last meeting by Major Bogle.

5.—From Edward O'Riley, Esq., giving an account regarding the soils, plants, &c. alluded to among the presentations.

6.—From Dr. Alexander Gibson, Supt. Government Botanic Gardens, Bombay Presidency, enclosing a memorandum on the mode of cultivating tobacco at Latakia, and affording a few additional particulars regarding the ground-nut and castor-oils, expressed by Bramah's Press.

The above communications were transferred to the Committee of Papers.

7.—From J. O. B. Saunders, Esq., intimating, in reply to an enquiry, that the white linseed is unknown at Allahabad and in the Doab.

8.—From Capt. G. E. Hollings, stating, that as far as his information at present extends, the white linseed is not cultivated in Oude. Captain Hollings sends a small quantity of the white *Til* grown at Lucknow.

9.—From Dr. Griffith, giving an analysis of the replies to questions put to various parties in Calcutta and in different parts of India, to whom bulbs were forwarded from the supply transmitted by Mr. Groom in 1843.

*Resolved,* that a copy of this analysis be sent to Mr. Groom, and the amount of his bill be liquidated.

For all the above communications and presentations, the best thanks of the Society were accorded.

## *Report of the Agricultural and Horticultural Society of India, for the year* 1844.

Introduction.

The close of another year of the Society's existence renders it necessary to offer a short summary of its proceedings since the submission of its report for 1843.

Economy of the Society.

The internal economy of the Society is the subject which perhaps claims priority of notice. Since the close of the last year, there has been an accession of forty-seven new members. Of these seventeen are Civilians in the service of Government, nine are Military and Medical Officers, six are Indigo Planters, eleven are Mercantile, two are of the legal profession, and two are of a miscellaneous class. The loss from deaths has been the same as last year, while that from resignations has been considerably less. There have been fifteen deaths, thirty-three resignations,—eleven being in consequence of departure from the country,—and six, (Messrs. G. DeGorastiza, Edward Bathurst, G. R. Dennison, Captain R. Wr[illegible]hton, Mirza Mehdi Meskie, and Baboo Cossinauth Bhose,) struck off for non-payment of subscriptions; in all fifty-four

The following tabular statement affords the details more fully in comparison with forcgoing periods, and at the same time represents an analysis of the constitution of the Society :—

| | In 16 former years. | In 1837. | In 1838. | In 1839. | In 1840. | In 1841. | In 1842. | In 1843. | In 1844. | Gross Total. | Total real number at the close of 1844 after deducting lapses. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Honorary Members, ... ... | 6 | 1 | 0 | 1 | 0 | 2 | 0 | 1 | 0 | 11 | 9 |
| Free Members, ... ... | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 2 |
| Civilians in the service of Government, ... ... | 46 | 41 | 11 | 27 | 27 | 19 | 21 | 14 | 17 | 223 | 169 |
| Merchants and Traders, .. | 31 | 36 | 28 | 15 | 19 | 13 | 18 | 16 | 10 | 186 | 124 |
| Indigo and other Tropical Agriculturists, ... ... | 25 | 21 | 43 | 23 | 27 | 21 | 7 | 15 | 6 | 188 | 97 |
| Military Officers, ... ... | 34 | 17 | 18 | 15 | 18 | 21 | 4 | 16 | 4 | 147 | 89 |
| Medical ditto,... ... ... | 14 | 16 | 10 | 7 | 7 | 10 | 9 | 1 | 4 | 78 | 37 |
| Asiatics, ... ... ... | 13 | 9 | 7 | 1 | 7 | 8 | 6 | 5 | 1 | 57 | 35 |
| Clergy, ... ... ... | 5 | 2 | 2 | 1 | 0 | 1 | 1 | 1 | 0 | 13 | 3 |
| Law Officers, ... ... ... | 14 | 5 | 1 | 5 | 3 | 0 | 6 | 2 | 2 | 38 | 24 |
| Miscellaneous, ... ... | 0 | 0 | 3 | 0 | 2 | 0 | 2 | 0 | 2 | 9 | 5 |
| | 188 | 148 | 123 | 95 | 110 | 95 | 75 | 68 | 47 | 952 | 594 |

*If from this return of five hundred and ninety-four Members, thirty-eight who have compounded for their subscriptions be de*ducted, with nine Honorary Members, one hundred and thirteen absentees in Europe, and two Free Members,* there will remain four hundred and thirty-two as the actual number of paying Members now on the books of the Society.

Necrology.

Among the Members who have been taken away from the Society by death, Baboo Ramcomul Sen may perhaps be reckoned as the foremost whose loss has to be deplored. Connected with the Society very shortly after its formation, he was one of the few of its remaining original Members. For several years he held the post of Native Secretary and Collector, and, at a more recent period, he was a Vice-President of the Institution. The good example he set his countrymen, and that too at a time when they gave little or no attention to any matters connected with the welfare of the country, is deserving of much praise. In his regular attendance at the monthly meetings, and in the lively interest he took in agricultural pursuits, the Society regrets to add, he stood almost alone among the Native Members of the Institution. An useful Member of the Society has also been taken away by the hand of death, in the person of Mr. G. F. Hodgkinson, who was at all times ready to afford the institution the benefit of his services: from his practical knowledge of many of our Indian fibrous vegetable substances, he was in particular an excellent Member of the Hemp and Flax Committee. In Mr. M. A. Bignell, a Member of its Committee of Papers, the Society has also lost a valued adherent.

Besides these names, the Society has to regret the loss of Captain H. Bigge, Assistant to the Commissioner of Assam; Mr. J. C. C. Sutherland, Secretary to the Indian Law Commission; Mr. T. P. Morrell, Merchant of Calcutta; Mr. George Henderson, Attorney, Supreme Court, Calcutta; Major E. Pottinger, C.B.; Mr. Chas. Oman, Indigo Planter, Jessore; Rajah Cowrkrishnath Roy, Behadoor, Rajah of Cossimbazar; Mr. G. H. Clarke of the Civil Service;

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* Captain E. P. Nisbet, commander of the *Agincourt*, was elected a free Member during the present year.

*Revd. H. Pratt, Chaplain at Nusseerabad; Baboo Bissonath Mutteeloll, Merchant, Calcutta; and Major H. Carter of the* 73d *N. I.*

Indian Wheat Question. Petition to Parliament.

In the last report an allusion was made to the steps which had been taken, by a Committee specially appointed, for obtaining information respecting the cultivation and production of wheat in India, previous to the drawing up of a petition to the Home Government, for its admission into British Ports on an equalized duty with the produce of Canada. The Society has pleasure in stating, that the enquiries of its Committee, though not responded to by all the parties addressed, have elicited much valuable information from Behar and Upper India. The substance of this information will be found in No. XI., of the second volume of the Journal, published in the early part of the year. A report,* and a long tabular statement based on this information, were presented at a *special* meeting held in March, at which it was resolved, that a petition to both Houses of Parliament should be prepared. A form of petition was accordingly submitted, agreed to at the following general meeting, and transmitted by the March mail to the care of the Earl of Auckland, (the former Patron of the Society,) and Joseph Hume, Esq. At the August meeting the replies of the Earl of Auckland, and Mr. Hume, were submitted. After stating, that feeling strongly the justice of the prayer, he had not hesitated to lay the petition before the House of Lords, and to express his opinion in its favor, the Earl of Auckland remarks, "I would fain hope that at no very great distance of time the relaxation of duty which has taken place to the advantage of Canada, will be extended to the other dependencies of the Crown. I much, however, regret that the discussion which took place in the House of Commons, on the 26th of March, holds out no prospect of an immediate and favorable consideration of the subject by the Government." Mr. Hume lost no time in sending a copy of the

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* In this report the Committee observe, that "the result of the investigation has been to satisfy them that this country is able to grow wheat that would find a ready sale in the home market, and that it can be produced and exported at such cost as would yield a very liberal return for the capital employed."

*petition to the Court of Directors, who forwarded it to the Board of Control, with the expression of their earnest hope, that it would* receive due attention from Her Majesty's Government. In a second communication Mr. Hume adds, "On the 31st of May, I presented the petition, and gave notice that on the 3d of June, I should move to have the petition printed, with the intention of bringing on a discussion of the subject at an early day. But I must add, that the question having been settled at the general debate on Mr. Hutt, 'for all the colonies,' I cannot expect any other result than rejection of my motion."

Since that period the Society has not received any further communications in respect to this petition; so the question, for the present at least, may be considered as having been unfavorably disposed of. But though the agitation of the subject has not produced any immediate benefit, it has been the means of procuring information which can scarcely fail to be of service on any future re-opening of the question.

Sugar Duty question.

The next subject in point of importance, though one of the last as respects the period in which it was brought forward, that has engaged the attention of the Society, is that, connected with the proposed change, by the British Parliament, during the session of 1845, of customs duty on East Indian grown and other sugars. The matter first came before the Society at its Meeting in October, in the form of a communication from A. Sconce, Esq., of the Civil Service, urging the propriety of some prominent steps being taken by the Society, for the purpose of representing the interests of India in this important question. Appreciating fully the value of this suggestion, and with a view to give effect to it, the Society lost no time in appointing a special Committee, who, having given full consideration to the subject, are unanimously of opinion, that a petition should be presented to the two Houses of Parliament, and they hope to submit the draft of one at the first Meeting in 1845. As the result will naturally form a subject of fuller notice in the next annual report, it is unnecessary, and would perhaps be premature, to add any thing further regarding the question on the present occasion.

Cotton Culture in the district of Dacca.

*The cotton culture in India, but more particularly in the district of Dacca, has somewhat engaged the attention of* the Society during the past year. As the various communications* which have been transferred by the Government of Bengal to the Society, regarding the measures which it has taken with a view to the introduction of foreign cotton into the Dacca district, and for the improvement of the indigenous varieties, are published in the numbers composing the third volume of the Society's Journal, it is perhaps unnecessary in this place to enter into detail on the subject. It may, however, be mentioned, that after an inspection for several months, of various localities in the district, Mr. J. O. Price, the gentleman appointed by Government to survey that part of the country, and who has had experience in cotton cultivation in the United States, has given his opinion to the effect, that not only the indigenous but exotic cottons can be grown to a large extent, with great prospect of success, in many parts of the Dacca district. The Government has accordingly sanctioned the formation of an experimental farm on the banks of the Banar River. In consequence, however, of the lateness of the season, it has been thought desirable to postpone the commencement of operations till next year, which will also allow a longer time to make all the necessary preliminary arrangements. At the request of Government, the Society transferred to Mr. Price a large quantity of New Orleans cotton seed, acclimated at the Coimbatore farms, for the new plantation, but this supply not being immediately required for that purpose, it has been distributed among such Zemindars of the district as have agreed to pay attention to the culture.

Renewed application to the Honorable Court of Directors for occasional supplies of Agricultural seeds.

It was stated in the last report, that the Honorable the Court of Directors had agreed to meet, to a certain extent, the request of the Society, preferred in 1841, in respect to the despatch of Agricultural and other seeds of an useful kind, when

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* See Mr. Price's reports of his proceedings from November 1843, to August 1844, and an interesting paper from the pen of J. Dunbar, Esq. Commissioner of the Dacca Division, on the present state of the manufacture of cotton fabrics in that quarter.

Prize for a good Vernacular Hand-Book of Agriculture, Horticulture and Farming.

In the report for 1842, it is stated, that with a view to encourage the planting of trees in the North-western Provinces, H. C. Tucker, Esq. of the Civil Service, had transferred to the Society a gold medal and 300 Rupees, to be awarded to any person who should shew the largest new plantation of trees in the Agra presidency, at the close of the year 1842. Notwithstanding that every publicity was given to this offer, no claimant had come forward up to the close of 1843. It was therefore thought advisable to direct the prize to some other object of Agricultural utility, and in communication with the donor, it was suggested by the Committee of Papers in the early part of the year, and agreed, to offer it to any person who will produce a good *vernacular* Hand-Book of Agriculture, Horticulture and Farming, suited to natives of India, giving them practical hints on the improvement of produce by change of seeds; rotation of crops; artificial grasses, &c. &c. with a brief explanation of the *rationale.* It may here be mentioned, that a claimant for this prize has already appeared, and his work is under the consideration of the Committee of Papers.

Change from an annual to quarterly Exhibitions of vegetables and fruits.

The Society has paid considerable attention, during the year, to its labours in the Horticultural department. As the proposed change from an annual to quarterly exhibitions of indigenous and foreign vegetables and fruits, was agreed to in 1842, (though it was not thought neces-sary to carry it fully into effect till the following year,) it is cursorily glanced at in the report for that year. The bringing of our vegetables and fruits earlier into the market, and retaining them longer in season, is the principal object contemplated by this arrangement. Three shows have been held during the year, namely, in the months of January, May and October. The native gardeners appear to understand the objects aimed at by this change, and so far as the result of one year's experiment admits of an opinion being formed, it seems likely to answer the anticipations of the Society. In connection with this subject, the Society desires to allude to the liberal donation of 264 Rs. which has been placed at its disposal by a member (W. P. Grant, Esq.,) for the express purpose of improving the growth of celery, a vegetable which, though requiring more, has received less attention at the hands of the native gardeners, than perhaps any other of the more common European vegetables. It has been agreed to have three shows in 1845, namely, in March, May and October, being the periods when this vegetable is respectively at the greatest perfection, at the latest season to which it can be kept back, and the very earliest time for production. With the view of giving every assistance to the *mallees* in competing for the handsome prizes to be awarded at these shows, the Society has distributed among them directions, (printed in Bengallee,) for cultivating this vegetable, and as a long time has been allowed them for its cultivation, it is expected the result will be satisfactory.

Establishment of Floricultural Exhibitions.

A new feature in the proceedings of the Society during the past year, consists in the encouragement which it has commenced to give towards the improvement of flowers. It can scarcely fail to be apparent, that within the last few years a greater degree of interest than formerly existed, for floricultural pursuits, has arisen among all classes of the inhabitants of this presidency. For some time past the Society has lamented that the many other, perhaps more legitimate, calls upon its funds have prevented its fostering this growing spirit for so delightful a recreation. Now, however, it has the gratification of stating, that this difficulty has been removed by the liberality of a zealous patron of floriculture, Sir Lawrence Peel, who has placed the sum of four hundred Rupees per annum at the disposal of the Society, chiefly with the view of encouraging a taste in the growth and improvement of flowers. To carry out the object of the liberal donor, the Society has established quarterly exhibitions of flowers. A commencement was made in October, at which the produce of private gardens formed the chief part of the show; but there is little doubt, now that the circumstance is more fully known, that native nurserymen will also enter the field as competitors.

Medals awarded for Cattle.

In the department of rewards, the Society has to report, (in addition to the prizes at the quarterly shows of vegetables, fruits, and flowers,) the adjudication, at the exhibition of cattle held on the 1st of February, of the following medals :—

To Mr. C. Ladd, for the best imported cow of any denomination, the silver medal.

To C. J. Richards, Esq. for the best cross, the produce of an imported bull or cow with native stock, the gold medal.

To Mr. A. Rose, for the best bull-calf of any denomination, calved in 1843, the gold medal.

To Mr. J. Wallace, for the best cow-calf of any denomination, calved in 1843, the silver medal.

To William Storm, Esq., for the best wooled cross between an imported ram or ewe and indigenous stock, the gold medal.

To John Muller, Esq., for the second best wooled cross between an imported ram or ewe and indigenous stock, the silver medal.

For the reasons given in the last report; namely, "that the attempt to improve cattle and sheep by money premiums and medals, has not held out sufficient encouragement in the number of cattle brought forward at the shows, to induce a continuance of the annual exhibitions," the above was the last exhibition of the kind under the patronage of the Society.

Agricultural Department.

In consequence of the continued deprivation of the privilege it formerly enjoyed of transmitting *agricultural* seeds all over the country free of postage, the Society has not been able to do so much in this department as could be wished. It has, however, sent occasional supplies to members and others, whose localities are situated at or near the line of route traversed by the Government steamers, the privilege of free transmission by that channel being still allowed.

Carolina Paddy.

It was mentioned in the report for 1843 that, to meet the numerous demands for Carolina paddy, the Society had ordered, through the friendly agency of Messrs. Haworth and Hardman, of this city, a consignment of seed which was expected in April of this year. This expectation has not been realized. The order was unfortunately lost in the *Memnon* steamer, and the duplicate order reached too late to allow of the agents at Liverpool acting thereon, with any probability of their procuring seed direct from Carolina in time for the sowing season here; they were also unsuccessful in their endeavours to procure any good and fresh seed in the market. This has been a great disappointment, for in addition to the previously-registered applicants, several others had requested to be supplied from this expected consignment. Being well aware, from trials given to seed furnished him by the Society three years ago, how admirably the soil and climate of Arracan are suited to this description of paddy, Major Bogle, the Commissioner of the province, applied to the Government of Bengal to procure a large quantity of the grain for him for distribution among the best cultivators, with the view of fully introducing it into that large rice-producing country. The Government, in a communication submitted at the December meeting, requested to be favored with the views of the Society, as to the expediency and best mode of meeting this application; and the Society, in reply, has strongly seconded the request, under the impression, that if carried out in the judicious manner proposed by Major Bogle, the introduction of so superior a description of paddy, can scarcely fail to add materially, in the course of time, to the resources of the province under his charge. The Society has also pointed out what, in its opinion, would be the best course to adopt to give due efficacy to this application.

Australian Wheat, Madder Seed, Wheat and White Linseed from Central India.

In connection with this department it may be mentioned, that the sum of £20 has been voted for a consignment of seed corn from Launceston and Sydney; and at the recommendation of a member, (J. Cowell, Esq.,) to whom the Society is indebted for several other useful suggestions, a small sum has been reserved for a limited supply of madder seed from Belgium or the South of France. From Colonel Ouseley, Agent to the Governor General, South West Frontier, who has exerted himself for several years "in bringing to notice the vegetable products of the districts under his charge, as well as the valuable grains of Central India,"* the Society has received a fine supply of wheats of sorts and of *white* linseed, procured at Hoosungabad. This latter article appears to be quite unknown in Behar and Upper India, and so far as the present enquiries of the Society extend, its cultivation would seem to be confined to the Nerbudda valley. A portion of this supply was sent, among other places, to Bhauglepore for trial in the Branch Society's garden, and Major Napleton reports, that "the linseed has come up most beautifully, and promises an abundant crop. The introduction into the Bhauglepore district," he adds, "appears to have excited considerable attention."

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* Mr. Griffith, in his paper on the Palms of British East India, in the Cal. Journal Nat. Hist. vol. 5, page 348, observes in reference to the *Phœnix Ouseleyana*, (n. sp.) "Colonel Ouseley, A. G. G. S. W. Frontier, first directed my attention to the distinguishing marks of this species, which I have therefore dedicated to him, and also as a tribute of respect for his exertions in bringing to notice the vegetable products of the districts under his charge, as well as the valuable grains of Central India."

Horticultural Department—Garden and Flower Seeds.

In the Horticultural department, garden and flower seeds have been obtained from America; garden seeds from the Cape; and flower seeds from England. The supply from America was received at two different times, the first consignment proved indifferent, the second was tolerably good. The seeds from the Cape have proved to be very good, but their receipt at a very late period of the season, has prevented several of the members in distant parts of the country, from participating in the distribution. This circumstance has been duly notified to the seedsmen, and it is hoped, that the steps taken by the Garden Committee, will prevent its recurrence. The Society regrets to add, that the flower seeds from England have entirely failed.* The Society does not attribute blame to the seedsmen, (Messrs. Veitch and Son, of Exeter,) for this failure; but, with the view of inducing a greater competition, the amount voted for the next season has been divided between them and Mr. Carter of High Holborn, London, who has been strongly recommended to notice by a member.

The garden of the Society has been duly attended to during the year. With the view of improving the soil, about 15 begahs of ground have been deeply trenched; a substantial road or walk, ten feet in breadth and upwards of one thousand feet in length, has been constructed through the centre of the garden, and the formation of branch walks is contemplated, as circumstances permit. A long slip, on the North side, of newly trenched ground, has also been set apart for an orchard, to meet the constant calls from members for fruit trees. To assist in stocking this orchard, applications have been made to correspondents at Mauritius, Ceylon, Madras, Bombay, the Straits, the Cape, &c. and at various localities on this side of India.

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* Major Napleton states, that many of the garden and flower seeds sent by these seedsmen for the Bauglepore Branch Society, have failed to germinate this season, though the supply of 1843 was of excellent quality. He attributes this failure to the seeds having been packed in *tin*, as was the case with the consignment forwarded to the Parent Society. It is, however, worthy of notice, as regards the packing of seeds in tin, that this mode has been always adopted by the Society's seedsmen at the Cape and at Philadelphia, and the seeds have generally given satisfaction.

Improvements at Nursery Garden.

In consequence of the very little demand in 1843 for Otaheite and other superior varieties of sugar cane, it was deemed advisable to reduce the cultivation. This has proved unfortunate, in as much, as the calls in 1844 have far exceeded the supply. To meet a probable large demand next season, the Society has appropriated an additional portion of ground for this culture.

Sugar Cane culture.

Large supplies of tobacco-seed of the Cuba, Gibali, Latakia and Bhilsa varieties have been gathered and distributed; also guinea grass seed and roots, plants of the pandanus vacoa, morus multicaulis, Mauritius sweet potatoes, Tenasserim yams, &c.

Tobacco Seeds of sorts, Guinea Grass, Pandanus Vacoa, Yams, &c.

In order to admit of an extension of various useful cultures, and to allow of portions of the ground lying fallow, the Society has very lately preferred an application to Government, through Dr. Wallich, Superintendent of the H. C. Botanic Garden, for an additional grant of about 25 begahs of uncultivated ground, situated on the west side of the Nursery, and forming, at present, part of the Botanic Garden.

Application to Government for an extension of Ground.

Here it may not be out of place to allude to the circumstance of a liberal supply (16 cwt.) of Peruvian guano having been placed at the disposal of the Society by W. P. Grant, Esq. A portion of this supply has been devoted to experiments at the garden in comparison with other manures, which are unfavourable to guano; but, under the impression that the relative quantity employed was

Presentation of Guano; experiments with at the garden; and distribution to Members.

*not sufficient, further experiments are to be made. The Society has also been distributing some of this stock to members in various* parts of the country, on the understanding, that they will communicate, in due course, the result of their experiments.

The Metcalfe Hall.

It was stated in the last report, that the Metcalfe Hall, towards the erection of which the Society had subscribed the sum of 16,000 Rs., was rapidly approaching completion, and would doubtless be fit for occupancy in the early part of 1844. Although the building was completed several months ago, and although the subject of the Society's taking possession of the apartments intended for its use has been frequently alluded to at the monthly meetings during the year, the Society much regrets to add, that there appears to be no immediate prospect of its quitting its present habitation in the Town Hall. At the October meeting, the substance of a letter from the Committee to the builders was read, and a hope was expressed, that the offer therein made, as respects the balance (13,000 Rs.) due to Messrs. Burn and Co. would remove all difficulties. This hope has not been fulfilled. A public subscription has since been commenced by the Metcalfe Hall Committee, and the sum subscribed to the present time amounts to Rs. 4450.

Bust of the late Rev. Dr. Carey.

It was also mentioned in the last report, that the sum of £120 had been remitted to Professor Royle, for the purpose of procuring a marble bust of the late Rev. Dr. William Carey, the founder of the Society. By a communication from that gentleman, received in September, the Society is informed, that he has given the commission to Mr. Lough, one of the leading sculptors of the day.

Formation of two additional Standing Committees.

Besides the business before cursorily alluded to, it may be mentioned, that in consequence of the various questions which have lately come before the Society, connected with foreign and indigenous cereal grasses, and with oils and oil seeds, it has been deemed desirable to form two distinct Committees for the consideration of such matters. These have been incorporated in the list of Standing Committees, under the appellation of the "Grain Committee," and "Committee for Oils and Oil Seeds."

Literary Dept.—Journal of the Society.

*As connected with its literary department, the Society has to report the substitution of a Journal in parts for its former monthly* issue. This change has been brought about in consequence of an insufficiency in the supply of original matter rendering it impracticable for the Committee of Papers to bring out the work with regularity. The Committee have expressed their hope of being able to issue four parts, consisting of about 150 pages each, or one volume, annually; and the Society anticipates that, with the continued assistance of Government, and its own correspondents, and from an arrangement, not yet quite matured, with the kindred institution at Bombay, no difficulty will be experienced by the Committee in fulfilment of this expectation. It may be added, that in addition to Nos. 11 and 12 of volume 2, three parts of vol. 3 have been published during 1844.

Acknowledgment to Committee of Papers, and to Correspondents.

The Society would take the opportunity, in concluding this brief annual summary of its proceedings, to acknowledge its obligations to its Committee of Papers for their superintendence of the Journal, as also to the Government, and to its correspondents, for the several communications which have been presented and published during the year. To the Government of the N. W. provinces it is indebted for a report by Dr. Wm. Jameson, Superintendent Botanical Gardens, N. W. Provinces, on the cultivation and manufacture of tea in Kemaon; to the Government of Bengal for a series of reports, by Mr. J. O. Price, in reference to the localities in the Dacca and adjoining districts best suited for the cultivation of cotton, and for other correspondence connected with the proposed establishment of experimental cotton farms in that quarter; to Mr. J. W. Masters, for his observations on tea culture in Assam, drawn up at the request of Major Jenkins, and for his remarks on the Assam tea plant in comparison with the tea plant of China; to Mr. John Owen, for his memoranda on the manufacture of black tea, and on the method of collecting opium as practised in Assam; to Major Jenkins, for his hints on the management of the grape vine in an unpropitious soil and climate, &c.; to Mr. R. Ross, Head gardener H. C. Botanic garden, Calcutta, for his remarks on the best mode of propagating plants in India;

*to Mr. S. H. Robinson, for his notes on the cultivation of sugar* cane *in* Bengal; to *Mr.* H. *Groom for his hints on the* management of certain bulbous flower plants; to Mr. *G.* Tradescant Lay, *for* a translation from a Chinese work on the culture of the mulberry tree; to Dr. Alexander Grant, (Bengal Medical service,) for a diary of Chinese husbandry, from observations made at Chusan in 1843-1844; to Dr. W. Griffith for his memorandum on the black dye plant of the Shans, and on the Gutta Percha; and to Mr. L. Wray, for the *second* part of his "Sugar Planters' Companion." In regard to the last mentioned paper, it may be observed, that it has been inserted, in continuous parts, in nearly all the numbers comprising the 2d and 3d volumes of the Journal, and is undoubtedly the longest treatise that has appeared under the auspices of the Society. Besides the above mentioned, the Society is indebted to several of its members for the information supplied by them in connection with the Indian wheat question, and to others, whose communications are published in the correspondence department of the Journal.

### *Report of the Finance Committee.*

At the termination of the year 1844, this Committee have the honor to report the operations of the Agri-Horticultural Society in its *Finance Department,* which for greater facility of reference, they submit in the annexed statements, exhibiting

By No. 1.—The *Total Receipts* from 1st of January to 31st of December 1844, being Co's. Rs. 17,811 : 5 : 2, and the *Disbursements* for the same period, Co's. Rs. 16,220: 4: 3, leaving a balance in favour of the receipts, of Rs. 1,591 : 0: 11, of which Rs. 946 : 9 : 9 is a deposit in the Bank of Bengal, and Rs. 644 : 7 : 2 in the hands of the Government Agent.

By No. 2.—An account current closed to date, from Jas. J. Campbell, Officiating Government Agent, with a Memorandum of Government Securities deposited with him, in accordance with a vote of the Society; the amount thus invested being Rs. 10,433 : 5: 4

By No. 3.—A list of the subscriptions in *arrear,* amounting to Rs. 8,730, after deducting the sum of Rs. 416, irrecoverable as per particular account annexed.

*By No. 4.—A list of bills payable, amounting to Rs. 2,102 : 6 : 0, and by No. 5.—A Memo. of the liabilities of the Society for 1844, yet to be defrayed, equal to Rs. 920.*

It is gratifying to the Committee to be able to state, that although the Society has been subjected to heavy expences for dawk charges on its Journals and letters, in consequence of the withdrawal of the privilege of free postage which had been enjoyed by the Society until 1842, and although its funds have been in requisition for an advance on account of furniture for the Metcalfe Hall, and also to the extent of about 400 Rs. for improvements at the Nursery Garden; yet the accompanying accounts exhibit not only that the cash balance is greater than last year, but that also a considerable reduction has been effected in the liabilities.

The Committee regret that before closing their report, they find it necessary to call the attention of the Society to the arrears for subscriptions still remaining due. These sums now equal about 8,000 Rs., shewing an increase in the amount of this dependency of 2,000 Rs. over last year; but as the degree of success of this institution must chiefly depend upon the amount of pecuniary assistance it receives, the Committee trust, that this intimation of the state of the funds may induce every well-wisher of the Society to come forward with his subscription without further delay.

(Signed) CHARLES HUFFNAGLE,
" M. S. STAUNTON,
*Members of Fin. Com. of Agri-Hort. Soc. of India.*

*Calcutta, December* 31, 1844.

## *Statement of Receipts and Disbursements of the Agricultural and Horticultural Society of India, from 1st January to the 31st December, 1844.*

### RECEIPTS.

| | | |
|---|---|---|
| From Members, subscriptions collected during the year, ... | | 11,920 4 0 |
| ,, Government annual donation, ... ... ... | 1,045 0 0 | |
| ,, Ditto, monthly allowance for 12 months at 135 : 13 : 6 per month, ... ... ... ... ... | 1,650 2 0 | |
| | | 2,675 2 0 |
| ,, Proceeds of a portion of surplus Cape vegetable seeds sold in 1843 and 1844, ... ... ... ... | 336 0 0 | |
| ,, Ditto, of sugar cane, delivered from the Nursery Garden, ... | 530 9 0 | |
| ,, Ditto, of copies of the Transactions of the Society, ... | 66 0 0 | |
| ,, Ditto, of copies of the Journal of the Society, ... ... | 135 13 0 | |
| ,, Ditto, of a quantity of Goor sold, ... ... ... | 49 13 9 | |
| ,, Ditto, of Gumlahs, &c. furnished from the Nursery Garden, | 2 13 0 | |
| ,, W. P. Grant, Esq. as premiums to be awarded during 1845 to the most successful cultivators of Celery, ... ... | 264 0 0 | |
| ,, Sir Lawrence Peel, Donation to the Society for the latter half of the year to encourage the culture of flowers, &c. ... | 200 0 0 | |
| ,, The Ceylon Agricultural Society, being the cost of freight on box of vegetable seeds paid by this Society in 1843, ... | 40 0 0 | |
| ,, Accruings of interest on fixed assets, ... ... | 422 4 6 | |
| | | 2,047 5 3 |
| Total Receipts, Co's. Rs. ... ... ... | | 16,642 11 3 |
| Balance in the Bank of Bengal on the 31st December, 1843, | 946 7 3 | |
| Ditto in the hands of Government Agent on ditto, ... | 222 2 8 | |
| | | 1,168 9 11 |
| Grand Total Receipts, Co's. Rs. ... ... ... | | 17,811 5 2 |

### DISBURSEMENTS.

#### FOREIGN VEGETABLE AND FLOWER SEEDS.

| | | |
|---|---|---|
| By C. N. Villet, for Cape Garden seeds, ... ... ... | 1,342 13 9 | |
| ,, Messrs. Landreth and Co. of Philadelphia, for American vegetable and flower seeds, ... ... ... ... | 1,603 14 9 | |
| ,, Messrs. Vetch and Sons, for English flower seeds, ... ... | 433 9 10 | |
| ,, Jaun Bux, for Agra Cauliflower seed, ... ... ... | 56 0 0 | |

#### PANDANUS VACOA SEED.

| | | |
|---|---|---|
| ,, T. F. Henley, Esq. for a supply of Pandanus Vacoa seed from Mauritius, ... ... ... ... ... | 18 0 0 | |

#### FRUIT TREES.

| | | |
|---|---|---|
| ,, Dr. Lamb, for 30 Malda mangoe grafts ... ... ... | 30 0 0 | |
| | | 3,481 |

#### SOCIETY'S TRANSACTIONS.

| | | |
|---|---|---|
| ,, Baptist Mission Press for printing, &c. 500 copies of Volume 8, of the Transactions, ... ... ... ... | | 1,332 0 0 |

## LIBRARY.

| | | |
|---|---|---|
| *By Books purchased during the year for the Library, ... ...* | | *152 4 8* |

## PRINTING.

| | | |
|---|---|---|
| ,, Sundry Parties for printing receipts, &c., ... ... | | 66 0 0 |

## JOURNAL.

| | | |
|---|---|---|
| ,, Bishop's College Press, for printing Nos. 7 to 12 of Volume 2, and also Part 1 of Volume 3 of the Journal, ... ... | 1,584 6 0 | |
| ,, Lithographing Plates for Journal, ... ... ... | 80 0 0 | |
| ,, Ostell and Lepage, for a ream of Paper for Plates for the Journal, ... ... ... ... ... | 10 0 0 | 1,674 6 0 |

## NURSERY GARDEN.

| | | |
|---|---|---|
| ,, Ordinary expences incurred on account of the Nursery Garden, from 1st December 1843 to 30th November 1844, ... | 1,903 15 9 | |
| ,, Additional expence (in part) for making a walk through the garden, trenching about 15 beegahs of ground, &c. ... | 400 0 0 | 2,303 15 9 |

## ESTABLISHMENT.

| | | |
|---|---|---|
| ,, Amount for establishment, from 1st December 1843 to 30th November 1844. ... ... ... ... | | 4,301 11 0 |

## MEDALS.

| | | |
|---|---|---|
| ,, Hamilton and Co. for gold and silver medals, ... | | 342 2 3 |

## PECUNIARY REWARDS.

| | | |
|---|---|---|
| ,, Prizes to Mallees for vegetables and fruits at the exhibitions held on the 13th January, 7th May, and 14th October, ... | 347 0 0 | |
| ,, Ditto to ditto for flowers at exhibition on the 14th October, ... | 100 0 0 | |
| ,, The Bhaugulpore Branch Society, annual amount, ... | 50 0 0 | |
| ,, The Cuttack ditto ditto, ... ... ... ... | 50 0 0 | |
| ,, Miss Zenut Davy, to defray the cost of manufacturing cloth from certain fibrous plants, as per Resolution of 14th February, ... ... ... ... ... | 100 0 0 | 647 0 0 |

## FURNITURE FOR METCALFE HALL.

| | | |
|---|---|---|
| ,, Messrs. Currie and Co. as an advance for furniture for the Society's apartments, Metcalfe Hall, ... ... | | 600 0 0 |

## SUBSCRIPTION.

| | | |
|---|---|---|
| ,, Schramm and LeBlond, a refund for the amount paid by them on account of Mr A. M. Bedier's Subscription to the Society, from 1838 to 1840. ... ... ... | | 56 0 0 |

## FREIGHT.

| | | |
|---|---|---|
| Freight on boxes of seeds from America, Cape, Bhauglepore, Lucknow, &c. ... ... ... ... | | 112 7 6 |

### ADVERTISEMENTS.

| | | | | | | |
|---|---|---|---|---|---|---|
| By Advertising in the public prints, notices of meetings, distribution of seeds, sugar cane, &c. &c. &c. ... ... | | | | 320 | 2 | 6 |

### STATIONERY.

| | | | | | | |
|---|---|---|---|---|---|---|
| ,, *Stationery for Office books, and for the use of the Office,* ... | *100* | *5* | *0* | | | |
| ,, Ditto eight reams of brown packing Paper for packing seeds, ... | 80 | 0 | 0 | | | |
| | | | | 180 | 5 | 0 |

### POSTAGE AND PETTY CHARGES.

| | | | | | | |
|---|---|---|---|---|---|---|
| ,, Postage on the Journal, on letters sent and received, and for petty expences, ... ... ... ... | | | | 640 | 0 | 0 |

### SUNDRIES.

| | | | | | | |
|---|---|---|---|---|---|---|
| ,, Custom House duty on 2 cases of English flower seed. ... | | | | 4 | 7 | 3 |
| Total Disbursements, Co's. Rs. | | | | 16,220 | 4 | 3 |
| Balance in the Bank of Bengal on the 31st December, 1844, ... | 946 | 9 | 9 | | | |
| Ditto in the hands of the Government Agent on ditto, ... | 644 | 7 | 2 | | | |
| | | | | 1,591 | 0 | 11 |
| Grand Total Rupees, | | | | 17,811 | 5 | 2 |

## MEMORANDUM.

### DISBURSEMENTS.

| | | | | | | |
|---|---|---|---|---|---|---|
| To Amount of Disbursements during the year 1844, as per statement, ... ... ... | | | | 16,220 | 4 | 3 |
| ,, Balance in the Bank of Bengal on the 31st December, 1844, ... ... ... ... | 946 | 9 | 9 | | | |
| ,, Ditto in the hands of the Government Agent on ditto, ... ... ... ... ... | 644 | 7 | 2 | | | |
| | | | | 1,591 | 0 | 11 |
| Total, Co's. Rs. ... | | | | 17,811 | 5 | 2 |

### LIABILITIES.

| | | | |
|---|---|---|---|
| Amount due by the Society for expences incurred for printing its Journal, gold and silver medals, English flower bulbs, and for furniture for the Metcalfe Hall, ... ... ... | 2,102 | 6 | 0 |
| Amount for prizes for Vernacular Hand-book of Agriculture, Horticulture, and Farming, and improvement in Indian Churka, ... ... ... ... ... ... ... ... | 920 | 0 | 0 |
| Total, Co's. Rs. ... ... | 3,022 | 6 | 0 |

### RECEIPTS.

| | | | | | | |
|---|---|---|---|---|---|---|
| By amount of Receipts during the year 1844, as per statement. ... ... ... ... | | | | 16,642 | 11 | 3 |
| ,, Balance in the Bank of Bengal on the 31st December, 1843, ... ... ... ... | 946 | 7 | 3 | | | |
| ,, Ditto in the hands of the Government Agent on ditto, ... ... ... ... ... | 222 | 2 | 8 | | | |
| | | | | 1,168 | 9 | 11 |
| Total, Co's. Rs.... ... .. | | | | 17,811 | 5 | 2 |

### DEPENDENCIES.

| | | | |
|---|---|---|---|
| Amount invested in Government Securities, lodged in the Government Agency Office, ... ... ... ... ... | 10,100 | 0 | 0 |
| Amount of Subscription in Arrear, ... ... ... ... | 8,557 | 0 | 0 |
| Total, Co's. Rs. ... ... | 18,657 | 0 | 0 |

*Meteorological Register kept at the Surveyor General's Office Calcutta, for the Month of [illegible]*

| Observed at 9 H. 50 M. | | | | | Observations Made at Apparent Noon. | | | | | Observed at 4 P. M. | | | | | Observations Made at Sun set. | | | | | Rain Gauges | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temperature. | | | Wind. | | Temperature. | | | Wind. | | Temperature. | | | Wind. | | Temperature. | | | Wind. | | |
| Barometer. | Of the Mercury. | Of the Air. | Of an Evapg. Surface. | Direction. | Barometer. | Of the Mercury. | Of the Air. | Of an Evapg. Surface. | Direction. | Barometer. | Of the Mercury. | Of the Air. | Of an Evapg. Surface. | Direction. | Barometer. | Of the Mercury. | Of the Air. | Of an Evapg. Surface. | Direction. | Upper. | Lower. |
| ches | ° | ° | ° | | Inches | ° | ° | ° | | Inches | ° | ° | ° | | Inches | ° | ° | ° | | Inches | Inches |
| 0,118 | 74,0 | 76,0 | 73,2 | N. | 30,078 | 76,0 | 81,5 | 76,0 | W. | 30,026 | 77,5 | 80,8 | 77,0 | W. | 30,034 | 77,0 | 78,0 | 76,5 | Calm, | | |
| ,118 | 73,0 | 76,0 | 72,5 | W. | ,078 | 76,0 | 81,2 | 77,0 | N. W. | ,021 | 77,7 | 82,0 | 78,5 | N. | ,026 | 77'8 | 78,4 | 76,9 | N. W. | | |
| ,130 | 73,8 | 77,0 | 74,0 | N. | ,082 | 76,5 | 81,0 | 76,6 | N. | ,006 | 78,8 | 82,4 | 79,0 | W. | ,009 | 78,0 | 78,5 | 77,0 | N. W. | | |
| ,114 | 74,4 | 76,8 | 74,0 | N. W. | ,073 | 77,0 | 81,8 | 77,0 | N. W. | 29,990 | 78,0 | 82,0 | 78,2 | N. W. | 29,998 | 77,8 | 78,7 | 76,4 | N. W. | | |
| ,124 | 74,8 | 76,0 | 74,4 | N. | ,078 | 77,0 | 81,0 | 77,4 | E. | 30,010 | 78,9 | 82,6 | 78,6 | N. E. | 30,016 | 78,4 | 78,8 | 77,0 | Calm, | | |
| ,150 | 74,5 | 77,0 | 76,0 | W. | ,102 | 77,0 | 81,7 | 80,5 | N. | ,042 | 78,8 | 81,8 | 78,8 | N. | ,050 | 78,4 | 78,4 | 76,0 | N. W. | | |
| ,165 | 74,0 | 76,8 | 73,0 | N. E. | ,130 | 77,0 | 80,0 | 75,0 | N. | ,062 | 78,4 | 80,[illegible] | 76,5 | N. W. | ,070 | 78,0 | 77,0 | 75,0 | N. | | |
| ,182 | 71,4 | 76,0 | 71,0 | N. E. | ,153 | 74,5 | 80,4 | 75,0 | N. E. | ,081 | 75,5 | 79,0 | 74,8 | N. | ,090 | 75,4 | 76,0 | 73,0 | N. | | |
| ,185 | 71,8 | 73,9 | 69,8 | N. | ,141 | 74,0 | 78,8 | 73,8 | N. W. | ,065 | 75,5 | 80,0 | 74,8 | N. W. | ,070 | 75,5 | 76,0 | 73,0 | N. W. | | |
| ,161 | 71,0 | 73,5 | 69,0 | N. | ,105 | 73,5 | 79,0 | 73,8 | N. | ,042 | 76,4 | 78,7 | 74,0 | N. | ,050 | 76,0 | 76,0 | 72,8 | N. | | |
| ,197 | 71,1 | 74,0 | 69,8 | N. | ,170 | 75,0 | 77,0 | 72,8 | N. | ,086 | 76,5 | 78,5 | 75,0 | N. | ,093 | 76,2 | 76,0 | 74,4 | N. | | |
| ,224 | 68,5 | 71,9 | 68,0 | N. (sharp) | ,190 | 73,0 | 76,5 | 71,5 | N. | ,110 | 74,4 | 76,7 | 72,6 | N. | ,121 | 74,0 | 74,0 | 70,5 | N. | | |
| ,214 | 68,0 | 70,3 | 66,0 | N. (sharp) | ,181 | 72,5 | 76,0 | 71,5 | N. E. | ,105 | 75,0 | 78,4 | 74,0 | N. | ,110 | 74,5 | 74,4 | 72,5 | N. | | |
| ,185 | 67,5 | 70,0 | 68,0 | N. | ,137 | 72,5 | 74,4 | 72,2 | E. | ,078 | 74,5 | 79,0 | 74,5 | W. | ,086 | 74,8 | 74,4 | 70,9 | Calm, | | |
| ,141 | 69,2 | 74,0 | 70,0 | E. | ,105 | 71,9 | 77,0 | 72,0 | N. | ,026 | 73,8 | 78,3 | 73,8 | N. | ,034 | 73,9 | 75,0 | 72,7 | N. | | |
| ,094 | 69,4 | 69,8 | 68,5 | N. E. | ,049 | 72,9 | 78,0 | 73,0 | N. W. | 29,986 | [illegible] | 80,0 | 74,8 | N. | 29,989 | 75,5 | 76,0 | 74,0 | Calm, | | |
| ,122 | 70,0 | 73,8 | 70,0 | N. E. | ,078 | 73,6 | 78,4 | 73,0 | N. | 30,013 | 76,4 | 79,4 | 74,0 | N. | 30,014 | 75,6 | 76,0 | 73,0 | Calm, | | |
| ,149 | 71,0 | 74,0 | 69,8 | N. E. | ,121 | 74,4 | 78,5 | 72,0 | N. | ,054 | 76,0 | 79,8 | 74,0 | N. | ,054 | 75,0 | 76,0 | 72,5 | Calm. | | |
| ,178 | 70,5 | 72,4 | 68,0 | N. E. | ,149 | 73,4 | 76,4 | 70,1 | N. | ,032 | 75,4 | 78,0 | 72,0 | N. E. | ,085 | 74,4 | 74,0 | 70,8 | Calm. | | |
| ,170 | 68,5 | 72,4 | 67,0 | N. E. | ,137 | 72,0 | 76,5 | 69,4 | N. E. | ,066 | 74,0 | 79,0 | 70,0 | N. W. | ,074 | 73,8 | 72,5 | 68,0 | N. | | |
| ,150 | 68,0 | 72,0 | 65,8 | N. | ,103 | 71,0 | 75,5 | 68,0 | N. (sharp) | ,034 | 73,0 | 76,0 | 70,5 | N. W. | ,037 | 72,8 | 72,0 | 67,8 | N. | | |
| ,154 | 66,0 | 70,0 | 65,4 | N. | ,109 | 69,4 | 74,4 | 67,8 | N. | ,041 | 72,0 | 75,0 | 68,0 | N. W. | ,048 | 71,5 | 70,4 | 68,0 | N. W. | | |
| ,162 | 66,3 | 69,5 | 66,0 | N. | ,137 | 70,4 | 76,0 | 72,0 | N. E. | ,082 | 72,5 | 76,0 | 72,8 | N. W. | ,086 | 72,0 | 72,0 | 71,8 | W. | | |
| ,133 | 65,4 | 69,8 | 66,0 | N. E. | ,093 | 69,8 | 76,2 | 70,0 | N. W. | ,017 | 73,0 | 78,0 | 73,8 | W. | ,022 | 72,8 | 73,0 | 71,9 | W. | | |
| ,265 | 67,0 | 68,0 | 66,0 | N. | ,241 | 69,4 | 70,7 | 68,6 | N. | ,194 | 71,5 | 76,0 | 72,5 | N. E. | ,200 | 71,5 | 72,2 | 70,8 | Calm. | | |
| ,289 | 67,4 | 72,0 | 70,0 | N. | ,248 | 71,2 | 76,5 | 7[illegible],8 | N. | ,193 | 74,0 | 80,0 | 75,0 | N. | ,202 | 73,6 | 76,0 | 73,3 | Calm. | | |
| ,253 | 69,1 | 73,4 | 70,0 | N. E. | ,217 | 72,0 | 78,0 | 73,5 | N. E. | ,145 | 74,2 | 80,0 | 75,0 | N. | ,150 | 74,0 | 76,7 | 73,2 | Calm. | | |
| ,225 | 69,0 | 70,0 | 70,0 | N. E. | ,170 | 72,0 | 74,0 | 71,5 | N. E. | ,100 | 75,0 | 82,2 | 76,0 | W. | ,106 | 74,0 | 75,0 | 74,5 | Calm. | | |
| ,189 | 70,0 | 68,5 | 68,5 | N. W. | ,138 | 73,0 | 75,0 | 72,5 | S. W. | ,065 | 75,0 | 82,3 | 75,0 | S. W. | ,080 | 75,0 | 77,0 | 75,2 | Calm. | | |

N. B. The Observations marked with Asterisks, signifying that clouds intervened at the time, are not included in the mean 99, 6°.

*Barometer by Troughton used prior to the 1st June 1844. Observations reduced to 32° Ft. = 29 493*

*[illegible] from 1st June to 31st August [illegible] Ditto [illegible] = 29 657*

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OF THE
# Agricultural & Horticultural Society
OF
# INDIA.

---

*APRIL 1st*, 1844.

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[illegible] A. H., Esq. *Medical service, Gwalior.*

[illegible]rton, Captain A. B., *Assistant Master Attendant, Calcutta.*

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[illegible]tt, Major James Richard, (17th Regiment N. I.,)

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Gibbon,† W. F., Esq. *Merchant.*

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Gladstone,† Adam S., Esq. *Merchant.*

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Rajbullub Seal, Baboo, *Merchant Calcutta.*
Rajmohun Roy, Chowdry, Baboo, *Landholder, Rungpore.*
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Ramdhone Ghose, Baboo, *Deputy Collector 24-Pergunnahs, Calcutta.*

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Tucker, Charles, Esq. *Civil service, Calcutta.*
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Watt, Robert, Esq. *Indigo planter, Tipperah.*
Watts, H. C., Esq. *Collector of Assessment, Calcutta.*
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Wight,* Robert, Esq. M. D., *Madras Medical service, Superinten*
*Government Cotton plantations, Coimbatore.*
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Wise,† Thomas, Esq. *Medical service.*
Woodcock, T. Parry, Esq. *Civil service, Allahabad.*
Wood, George, Esq. *Calcutta.*
Woollaston,† Henry A., Esq. *Merchant.*
Woomeschunder Roy, *Landholder, Santipore.*
Wray, L., Esq.
Wyatt, Thomas, Esq. *Civil service, Rungpore.*

Young,* Thomas, Esq. *Civil service, Backergunge.*
Yule J. W., Esq. *Indigo planter, Tirhoot.*

### *Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of November*, 1843.

| Days of the Month. | Moon's Changes. | Moon's Horizontal Parallax at Noon. | Observed at 9 H. 50 M. | | | | | | Observed at 4 P. M. | | | | | | Rain Gauges. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Temperature. | | | Wind. | | | Temperature. | | | Wind. | | | |
| | | | Barometer. | Of the Mercury. | Of the Air. | Of an Evapg. Surface. | Direction. | Aspect of the Sky. | Barometer. | Of the Mercury. | Of the Air. | Of an Evapg. Surface. | Direction. | Aspect of the Sky. | Upper. | Lower. |
| | | | Inches | o | o | o | | | Inches | o | o | o | | | Inches | Inches |
| 1 | | 54 | 29,894 | 69,9 | 72,0 | 69,0 | N. ........ | Cirro-strati. | 29,830 | 75,5 | 79,8 | 74,0 | N. E. ...... | Generally Clear. | | |
| 2 | | 54 | ,986 | 73,0 | 75,8 | 71,0 | N. ........ | Generally Clear. | ,900 | 76,2 | 80,0 | 74,2 | N. E. ...... | Clear. | | |
| 3 S. | | 54 | 30,025 | 72,8 | 77,1 | 72,0 | N. E. .... | Clear. | ,930 | 74,5 | 80,2 | 74,2 | N. ........ | Cirro-strati, | | |
| 4 | | 51 | ,025 | 74,0 | 75,0 | 71,0 | N. ........ | Generally Clear. | ,930 | 77,2 | 81,4 | 75,1 | W. ........ | Cloudy. | | |
| 5 | | 54 | 29,994 | 74,4 | 77,2 | 72,8 | E. ........ | Cloudy. | ,889 | 76,4 | 79,8 | 75,0 | S. E. ...... | Cloudy. | 0,72 | 0,77 |
| 6 | | 55 | 30,002 | 68,0 | 66,0 | 64,9 | N. E. ...... | Rain. | ,913 | 70,0 | 68,8 | 68,7 | Calm, ...... | Overcast. | 0,07 | 0,09 |
| 7 | ○ | 55 | ,014 | 71,0 | 72,0 | 70,0 | N. ........ | Cirro Cumuli. | ,918 | 74,8 | 78,0 | 73,8 | N. ........ | Clear. | | |
| 8 | | 55 | ,017 | 71,2 | 73,0 | 69,0 | N. E,...... | Clear. | ,933 | 74,0 | 77,0 | 72,2 | N. ........ | Clear. | | |
| 9 | | 56 | ,009 | 70,2 | 73,0 | 69,0 | N. W....... | Clear. | ,918 | 73,8 | 77,0 | 71,0 | N. ........ | Clear. | | |
| 10 S. | | 56 | 29,945 | 68,0 | 71,6 | 68,0 | N. (sharp).. | Clear. | ,853 | 71,6 | 77,0 | 72,0 | N. ........ | Clear. | | |
| 11 | | 57 | ,974 | 66,5 | 68,0 | 65,0 | N. (sharp).. | Clear. | ,880 | 72,0 | 76,2 | 70,2 | N. E. ...... | Clear. | | |
| 12 | | 57 | ,986 | 67,0 | 70,0 | 65,0 | N. (sharp).. | Clear. | ,905 | 70,8 | 73,0 | 67,0 | N. W.(sharp | Clear. | | |
| 13 | | 58 | 30,002 | 65,4 | 68,0 | 64,0 | N. ........ | Clear. | ,915 | 71,0 | 75,0 | 70,0 | N. ........ | Clear. | | |
| 14 | ☾ | 59 | 29,989 | 67,0 | 70,0 | 65,8 | N. (sharp).. | Clear. | ,898 | 72,0 | 76,0 | 70,0 | N. ........ | Clear. | | |
| 15 | | 59 | ,986 | 67,0 | 69,5 | 64,0 | N. (sharp).. | Clear. | ,894 | 71,6 | 76,5 | 70,0 | N. ........ | Clear. | | |
| 16 | | 60 | 30,010 | 65,6 | 68,0 | 63,0 | N. ........ | Clear. | ,910 | 70,5 | 75,0 | 69,0 | N. W....... | Clear. | | |
| 17 S. | | 60 | ,018 | 66,2 | 66,0 | 64,0 | N. ........ | Clear. | ,955 | 69,0 | 75,8 | 69,7 | N. W....... | Clear. | | |
| 18 | | 60 | ,081 | 66,0 | 69,0 | 64,0 | N. E....... | Clear. | ,986 | 71,0 | 76,0 | 70,0 | N. W....... | Clear. | | |
| 19 | | 60 | ,094 | 65,8 | 69,0 | 63,8 | N. ........ | Clear. | 30,009 | 72,9 | 76,8 | 69,0 | N. ........ | Clear. | | |
| 20 | | 60 | ,070 | 68,0 | 70,0 | 65,0 | N. ........ | Clear. | 29,974 | 69,8 | 76,1 | 70,2 | N. ........ | Clear. | | |
| 21 | ● | 60 | " | " | " | " | " | " | 30,006 | 69,5 | 73,8 | 76,0 | N. W ..... | Clear. | | |
| 22 | | 59 | ,082 | 64,8 | 63,0 | 63,0 | N. ........ | Clear. | 29,982 | 70,9 | 75,5 | 69,0 | N. ........ | Clear. | | |
| 23 | | 58 | ,017 | 67,4 | 71,0 | 66,0 | N. E....... | Clear. | ,947 | 69,8 | 76,5 | 71,8 | W. ........ | Clear. | | |
| 24 S. | | 58 | ,053 | 66,5 | 71,0 | 66,0 | N. E .... | Clear. | ,969 | 70,0 | 76,0 | 68,2 | N. ........ | Clear. | | |
| 25 | | 57 | " | " | " | " | " | " | " | " | " | " | " | | | |
| 26 | | 56 | ,022 | 68,5 | 76,0 | 71,0 | N. E. ...... | Clear. | ,925 | 70,8 | 79,0 | 73,2 | N. W....... | Cumuli. | | |
| 27 | | 55 | ,006 | 70,0 | 73,8 | 69,8 | N. E. ...... | Clear. | ,914 | 73,4 | 79,2 | 73,0 | N. W. .... | Cumuli. | | |
| 28 | ☽ | 55 | ,022 | 70,2 | 73,8 | 68,2 | E. .......... | Clear. | ,930 | 73,7 | 78,5 | 71,0 | W. ........ | Clear. | | |
| 29 | | 54 | ,025 | 72,0 | 74,0 | 69,0 | W. ........ | Clear. | ,930 | 74,1 | 78,0 | 71,0 | N. W....... | Clear. | | |
| 30 | | 54 | ,038 | 69,5 | 71,0 | 67,0 | N. .......... | Clear. | ,910 | 72,5 | 78,0 | 70,0 | W. ........ | Clear. | | |

# THE JOURNAL

# Agricultural & Horticultural Society

OF

# INDIA.

## No. XI.—1843.—Vol. II.

## CORRESPONDENCE AND PAPERS CONNECTED WITH THE CULTIVATION AND PRODUCTION OF WHEAT IN INDIA.

[In giving publicity to the following papers bearing on the cultivation, &c. of Wheat in India, the Committee of Papers deem it necessary to offer a brief account of the cause for which they were obtained. At a general meeting in May 1843, it was formally proposed, that the Society should petition the Home Government for the admission of Indian Wheat into British Ports, on an equalized duty with the production of Canada. This proposition met with attention. Before entering however into the merits of a petition, it was considered desirable that steps should be taken to procure every possible information connected with the cultivation and production of Wheat in India, and with this view, a Committee was appointed. The Committee lost no time in issuing circulars to correspondents of the Society, embracing the following points of enquiry :—

1.—On what description of land is Wheat grown in the districts you are acquainted with ?

2.—What rent does the ryott pay per beegah, and what is the size in square yards ?

3.—What is the cost of cultivating wheat land, including seed and rent?

4.—Is such land irrigated, and if so, how often during the growth ?

5.—When is it sown and reaped, and what the extent of crop in Calcutta bazar maunds ?

6.—Are other crops sown with it, and what are they ?

7.—At what rate per Calcutta maund could good wheat from your district be landed in Calcutta ?

8.—How many descriptions of Wheat are grown in the districts with which you are acquainted, and what are their respective qualities ?

9.—Can you favor the Society with small samples of each description procurable ?

Owing to various circumstances, which it is unnecessary to recapitulate, this call was not responded to by all, but that the request was not made in vain will be evident from a perusal of the communications now published. Several months necessarily elapsed before all the returns were sent in, when a tabular statement and a report based thereon were drawn up. These papers were submitted at a special meeting held on the 9th March 1844, and a Petition to both Houses of Parliament was directed to be prepared. At the following general meeting on the 13th idem, the Petition was agreed to and ordered to be transmitted to its destination. Although these documents have already been given to the public, through the medium of newspapers, as a part of the "proceedings" of the Society, the Committee of Papers deem it advisable to republish them in the Journal, with the view of inserting in one place all the papers connected with this useful enquiry.]

### *Replies from Colgong.* *By* JOHN OMAN, ESQ.

In compliance with your request, I have the pleasure of replying to the several queries contained in your letter of the 15th instant.

1st. Wheat is grown on alluvial and red-clay soils.

2d. The ryott pays from four annas to two rupees per biggah, containing 55 by 55, and 60 by 60 yards.

3d. The cost of cultivating seed and rent averages from 3-8 to 5-8.

4th. Wheat lands are not irrigated.

5th. Wheat sowings commence in October, and the crop is gathered in April. The extent of the crop I cannot at present ascertain.

6th. No other crops are sown with wheat.

7th. Good wheat can be landed in Calcutta at one rupee per maund.

8th. I am not aware of more than four descriptions of wheat, and these are called by the natives Doodie, Soonticric, Jamali and Buvgamoo.

I have this day despatched by dak bangy, four samples, and will, at a future period, state their several qualities.

*Colgong, 20th June,* 1843.

### *Replies from Monghyr.* *By* PETER PALMER, ESQ.

Observing in the papers the other day, some questions published, to which the Agricultural and Hoticultural Society are seeking replies, on the great subject of wheat and its transportation to England, I have been induced to give you as much information on this head as I have been able to glean, for the last seven or eight years, as a farmer in this district. I have been as concise as I possibly could, though the matter can be easily extended; however, at any other period you can command my knowledge.

1st. Wheat in this district is grown on various kinds of land: *Bheetah*, *Chour* and *Deerah*. In the two first, the production is generally of the first quality, fine, white and plumpy, called *doodeah*, but the quantity less, from three to six maunds. In the latter, though the quality is good, and the produce from four to twelve maunds per beegah, yet the color is dark, and it is called *Jum-mawley*. A third, and of inferior quality, can be had, this is of a very small grain, dark, and like the *Jum-mawley*, and I am led to believe it is grown on lands thinly crustated with earth, with a heavy bed of sand beneath, which gives but little nourishment to the roots, and checks the growth of the grain. It is a very remarkable fact, if the finest *doodeah* seed be sown on a *Deerah*, the production turns out *Jum-mawley*.

2nd. In good *Bheetah* and *Chour* lands, as far as three rupees per beegah is paid by the cultivator. A small tract of land in this district only, high *Deerah*, the last spot subject to inundation, pays four rupees the beegah; this spot occupies the *Rubbee* (summer,) *Bhudwee* (rainy,) and sometimes the *Khureefee* (winter) crops in one season, and from its rich and generative properties, no doubt is taxed at so high a rate by the Zumeendar. The *Deerah* lands are taken at from twelve annas to two rupees and eight annas per beegah. The beegah is 3,025 square yards.

3rd. The cost varies according to season. The chief expenses lay, *first* in the price of the seed, which is purchased by the ryott at from thirty to forty seers the rupee, oftener the first; and sometimes it is sold to the ryott by the Mahajuns, or monopolizers of the grain, at the prevailing bazaar rates, without money payment. In this case, an agreement is then entered into, in the shape of a *tamasook* (promissory note or bond,) for double the amount to be returned *in grain*, taking good precaution of adding the "*interest-grain*" into the document first, and thereby virtuizing the face of the instrument as a non-usurious transaction. *Second*, cost of land, as stated in paragraph above, to which is to be added certain extra charges *extorted* from the already beggared ryott by the Zumeendar, under the names of *Naig*: from two pice to one and half anna is charged on every rupee he has to pay per pottah. *Butta* at the same rate. *Chowkedary*, *Dak-barie*, *Punchite*, *Moonshufee*, or expenses for measuring the lands; *Burgundee* for proving the good qualities of the *sicca*, or in other words extracting from the ryotts the pay of the *Purkeeah* of the village. On this subject alone, I could fill several sheets, regarding the rogueries practised by the Zumeendars and the Bankers of the zillahs, to keep the sicca in circulation in the villages amongst the poor ryotts, for the better purposes of extortion; *salamee* of one rupee for each puttah given;—*extra Peons* when placed over a ryott or his harvest, for collecting kists, or watching the produce before being winnowed;—with numerous petty etceteras legalized by usage, as well as several illegal exactions prohibited by the Government Regulations. The whole of this tending to keep up a spirit of chicanery as practised by the ryotts against the landholders, of pilfering his own *khureean*, and allowing his own field to be *churried*. *Third*, ploughing, the feed of his oxen, or else the hire at two annas per day. And *fourth*, the labour of himself and family engaged in the field.

4. A very small portion indeed of the fields sown in this district with wheat, are irrigated. The *Deerah* and *Chour* lands never. Such of the opulent ryotts as can afford it, do irrigate *Bheetah* lands when the seed first springs up.

A weeding takes place at the early appearance of the plant, and this generally answers; it seldom extends to two weedings.

5. Sowings commence in *Assin* (September,) and continue to *Kartick* (October,) and sometimes extend to *Ughun* (November.) The reapings take place in *Fagoon* (February,) *Chyte* (March,) and *Basakh* (April.) The quantity this district is in the habit of producing, I have not been able, from the minutest enquiries, to ascertain correctly; but calculating from rough statement I have kept for the last eight years, I should say that Monghyr can send down from 50,000 to 60,000 maunds per annum, and there is not the least doubt, if encouragement is given to the ryott, the demands for the Home shipments may be increased. The cultivation could be made to exceed a lac of maunds. Some prejudices must be removed before this point could be gained. I should say the major portion of our wheat finds a market above us for internal consumption.

6. Only with gram, sometimes the borders are run with lin.

7. I annex you a memorandum of prices which I have kept since 1836.

| | | *Opened at.* | *Closed at.* | | *Opened at.* | *Closed at.* | |
|---|---|---|---|---|---|---|---|
| In 1836. | 1st. qual. Doodeah,.. | 45 seers | 40 seers | 1837 | 40 seers | 35 | aking the average. |
| | 2nd Bagrah,* ...... | 47½ do. | 41 do. | to | 42 do. | 37 | |
| | 3rd Jummawley,.... | 50 do. | 42½ do. | 1842 | 45 do. | 40 | |

These prices are not the bazar rates, but at what I have purchased in the *dehauts*. To this add from 5 to 6 annas per maund for collection, bagging, boat insurance and shipping charges to land in Calcutta.

8. Answered by the 7th paragraph.

9. The wheat of this season has been a general failure in quantity, quality, size, color, and even in taste; and to avoid prejudicing your Society, by such samples, I refrain

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* Called also Gungajelly.

from sending any. This much I must remind you of, the good quality of the wheat of this district has been well tested, of which the Strand Mills can well testify.

*8th July*, 1843.

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*Monghyr, 8th February*, 1844.

I should have replied to your favor earlier, but was prevented by calls on my farms. At this season, personal attendance is very necessary for the mutual benefit of the peasantry as well as the farmer; this will be a sufficient excuse, I trust, for the apparent neglect. It will always be a source of pleasure to me, to furnish whatever information lays in my power in the capacity of a farmer, which relates to lands, that the Society may at any time require.

Before I answer your queries, a word on the subject matter of Mr. Theobald's remarks, made at the Meeting of the Bengal British Indian Society, held on the 1st instant. I should be sorry if they were allowed to go forth before the public of this country, as well as that of England, uncontradicted. The growing of wheat in this country is not an infant undertaking. It is, and has been, the chief food of the better class of natives from time immemorial; but the careless system of cultivating it, "is in its state of infancy," and will remain so, while this oppressive scheme of taxation (on land) lasts. Mr. T. continues, "*that if the trade were opened, a shipload could not be procured*;" with all deference to this gentleman's knowledge, I would guarantee the filling at least five ships of 400 tons each from this very station alone, from the usual expected out-turns, without any increase of cultivation, or without any detriment to the indigo, opium, or sugar fields. At least 60,000 maunds can be furnished from zillah Monghyr.

*Deerahs* are lands formed by the influence of Freshes on that side of the river, directly opposite to that where its greatest strength is, and is *first* composed chiefly of sand, with a mixture, in portions, of muddy-clay. Time and the quick vegetation of a species of birch growing to the height of from 5 to 7 feet, causes an annual settlement of rich loam, until it forms from 3 inches to 3 or 4 feet in thickness; this ground pays the farmer from 4 annas to 2 rupees per beegah; and the best is good for indigo, wheat, mustard seed, and other grains used by the natives; yields but one crop; is generally inundated in the rains, therefore alluvial ground.

*Chour* is the natural ground, but lies flat, is subject to inundations, and is influenced by the rising of the river. *Bheetah* is high ground, and never inundated. These two soils almost resemble one another, and strictly speaking, I do not think it to be clay, at least not such as I have seen in Europe. I should call it a loam, of a dark orange color, in this part of India, with a thin surface of dark mould encrusted on it, formed from substances, no doubt, which have consumed on it, and is therefore very rich. The natives are led away with the belief, that wheat does not require a rich soil. *Bheetah* depends solely on the rains and irrigation, and sometimes produces three crops per year of various grains, and the former only one.

I should say a fair average extent of crop will be 10 maunds the beegah of 84 sicca weight, and the following as near the expenses as possible :—

| | | | | |
|---|---|---|---|---|
| Best ground per Beegah, | Rs. | 2 | 0 | 0 |
| 8 Ploughings for ditto, ... | | 1 | 0 | 0 |
| Feed of Plough-boy, ... | | 0 | 4 | 0 |
| Seed, say 35 seers, ... | | 1 | 0 | 0 |
| Weeding 2 annas, no expense for sowing, ... | | 0 | 2 | 0 |
| Cutting or Reaping, ... | | 1 | 0 | 0 |

———— 5 rupees and 6 annas for the cultivation of one Beegah, which gives from 4 to 16 maunds. To this should be added the transit charges from hence to Calcutta, which I have much pleasure in adding for your information; this is from actual shipments:—

| | | | |
|---|---|---|---|
| *To 100 maunds, at 1 rupee per maund,* | *Rs. 100* | *0* | *0* |
| Dalallie per maund, 2 pice, ... ... ... | 3 | 2 | 0 |
| Kayallee per maund, 1 pice, ... ... ... | 1 | 9 | 0 |
| Bags, 1 anna and 6 pie per bag, 9 : 6; and Cart 2 pice, 3 : 2 : 0, ... ... ... ... ... | 12 | 8 | 0 |
| Boat hire 16 rupees; Toll 1 rupee; Oil 8 as., . | 17 | 8 | 0 |
| Insurance 2 per cent. Fees, and Peon, ... ... | 11 | 0 | 0 |
| | Rs. 145 | 11 | 0 |

Equal to 1 rupee and 6 annas per maund, deliverable in Calcutta.

Regarding sowing and cutting, no payments in money are paid to the labourers. Say a couple of men or women are sent into the field with the grain, (35 seers for one beegah) they follow the ridging of the plough, and keep casting in the seed until they arrive at the end; whatever remains in their "*cummerbund*" is their perquisite; generally from 1 seer to 2½ each individual receives. In cutting, a nominal system of measurement, I may say, takes place; as the operation of cutting is proceeded in, the younger relatives of the labourers are engaged sheafing the corn; 15 sheafs are stacked on one heap, and one thrown by; this continues until the whole field is completed, the number of ones, is claimed by the reapers, and the fifteens are the property of the grower: these two include the whole expenses of labour.

## *Replies from Patna. By* C. J. MULLER, ESQ.

I have the pleasure to send you answers, the best I can give, to your queries concerning wheat; also specimens of the three sorts of the grain known here.

*28th September*, 1843.

1*st. On what description of Land, &c.*—Chiefly on high lands not at all, or only very partially, subject to inundation. The best soils for it are *Khewal* and *Dhorus.* The former is clayey, retractive of moisture; the latter is a lighter soil containing a larger admixture of silicious sand than the former.

2*d. What Rent, &c.*—The most common rates in the district of Patna are one and a half, two and a half, and three rupees per beegah. In cases where the soil is particularly fertile, and there are either wells or reservoirs of water for irrigation, together with other obvious advantages, such as proximity to a large market town, the rate may be six or seven rupees per beegah. On the *Deerah* lands opposite to the city of Patna, the rate per beegah is for some fields as high as seven rupees, and this, where there is no irrigation; but then the annual rise of the river renders this unnecessary. These high rates must be regarded as the exception, not the rule.

Wheat is also cultivated on the *Bhowly* tenure, that is where the Zemindar and the cultivator share the crops between them; sometimes in equal proportion; sometimes in a proportion more favourable to the Zemindar: the latter taking nine-sixteenths of the crop.

The beegah now in use in Behar and Patna contains 3,025 square yards, equal to five-eighths of an acre. This is the standard beegah of the Western Provinces, and obtained introduction here when the settlement of resumed *Lakiraj* tenures commenced.

3*d. What is the cost, &c.*—This must vary according to the rent paid for the land; the quantity of land cultivated, and the degree of care bestowed upon the cultivation. It is impossible to give a satisfactory reply to this query. An experienced and intelligent cultivator consulted on the subject, estimates the average cost at two rupees per beegah, (exclusive of rent.)

The quantity of seed sown is from thirty to forty seers per beegah. For the cultivation of ten beegahs, one plough with two or three oxen, as the case may be, are required. The ploughman receives while working three seers of grain a day. His employer lends him from four to seven rupees without interest, and gives him two beegahs of land to cultivate on the *Bhowly* tenure. At the division of the crops, the loan is repaid. It is obvious, therefore, that where the mode of remuneration is so peculiar, no definite sum can safely be put down as the price of labour.

Each ox while hard at work, gets ten seers of *bhoosee*, and one seer of oil cake per diem. The cost of the food varies with circumstances. Where the cultivator happens to be in possession of *bhoosee* and linseed himself, the expense is reduced.

The following is an endeavour to calculate the cost of cultivating wheat land, but it is most probable that in numerous instances, it would be found inconsistent with facts. Cost in cultivating ten beegahs of wheat land:—

| | | | |
|---|---|---|---|
| Seed, 300 seers, at 12 annas per maund, | Rs. | 7 | 8 |
| Rent, at 3 rupees per beegah, ... ... | | 30 | 0 |
| Labour of ploughman and cultivator, ... | | 9 | 0 |
| Food of oxen, ... ... ... ... | | 6 | 0 |
| | Rs. | 52 | 8 |

*4th. Is such Land irrigated, &c.*—As a general rule, wheat lands are not irrigated; but in cases of drought, and where the means of irrigation are at hand, this is of course done.

*5th. When is it sown, &c.*—It is sown in *Asin* and *Kartik*, (September, October, and November,) and it is reaped in *Phagoon* and *Choyt*, (March and April.)

The extent of the crop is exceedingly various—from 7 to 20 maunds per beegah. From 10 to 15 maunds is a common crop in good soils, in good seasons.

*6th. Are other crops sown, &c.*—Generally speaking, wheat is grown alone, but it does occur occasionally, that gram, *kirao,* (Pisum arvense,) or *musoor* (Ervum lens) is mixed with it.

*7th. At what rate, &c.*—All that can be said in reference to this question is, that the best wheat in the Patna market may be had at from 14 annas to 1 rupee per maund of 40 seers, at the proper season. It is cheapest in the months of *Chyt*, *Bysakh* and *Jeth*, and dearest in *Asin* and *Kartick*. The cost of carriage, &c. must vary according to circumstances.

The following tables give the average price of wheat for the last 10 years, compiled from monthly records:—

No. I.

| *Year.* | | *Price.* | | | |
|---|---|---|---|---|---|
| 1241, | Fusli,... | 35 | seers, | .562 | decimal, per rupee. |
| 1242, | „ ... | 35 | „ | .979 | ditto. |
| 1243, | „ ... | 35 | „ | .125 | ditto. |
| 1244, | „ ... | 37 | „ | .770 | ditto. |
| 1245, | „ ... | 41 | „ | .479 | ditto. |
| 1246, | „ ... | 41 | „ | .354 | ditto. |
| 1247, | „ ... | 48 | „ | .875 | ditto. |
| 1248, | „ ... | 38 | „ | .833 | ditto. |
| 1249, | „ ... | 36 | „ | .875 | ditto. |
| 1250, | „ ... | 42 | „ | .916 | ditto. |

No. II.

| *Year.* | | *Lowest Price.* | | *Highest Price.* | |
|---|---|---|---|---|---|
| 1241,... | 1 maund, | 2 | seers per rupee, | 30 | seers per rupee. |
| 1242,... | 1 | ... 3¾ | ditto, | 25 | ditto. |
| 1243,... | 1 | ... 6 | ditto, | 30¾ | ditto. |
| 1244,... | 1 | ... 5¾ | ditto, | 25 | ditto. |
| 1245,... | 1 | ... 2½ | ditto, | 27 | ditto. |
| 1246,... | 1 | ... 5 | ditto, | 28 | ditto. |
| 1247,... | 1 | ... 2½ | ditto, | 23 | ditto. |
| 1248,... | | ... 36 | ditto, | 24 | ditto. |
| 1249,... | | ... 39 | ditto, | 20 | ditto. |
| 1250,... | | ... 36 | ditto, | 22¾ | ditto. |

It will be perceived that it has been dearer during the last three years, than in the seven preceding ones. At this moment the price of the best wheat is 25 seers per rupee.

*8th. How many descriptions, &c.*—There are three distinct varieties, namely: the Bunarsi, the Doodiya and the Lall, placed here in the order of their excellence. The samples forwarded, will enable the Society to judge of their respective merits.

NOTE.—Estimating the weight of a quarter of wheat at 468 lbs. avoirdupois, which is equal to 5 maunds, 27 seers and 8 chittacks, and taking the Indian price at one rupee per maund, the value of a quarter of wheat here, is five rupees and eleven annas, which at 2*s*. per rupee is equal to 11*s*. 4½*d*.

## *Replies from Goruckpore. By* J. H. BRIDGMAN, Esq.

At the time I received your letter of the 15th of June last, addressing to me a series of inquiries on the subject of the cultivation of wheat, I was too ill to be able to reply to it. Subsequently the length of time which had elapsed, and the belief that I could furnish you with no information of importance, led me to think that a reply was no longer necessary. A repetition of the queries, however, forwarded to me a short time ago, shewing that information is still considered desirable, I write to answer them in the best manner I am able; but rather that I may not be thought indifferent to a question of great importance, than with the hope that I can communicate any thing of any value. I reply to the questions *seriatim*:—

1. On strong sandy loam.

2. In Goruckpore the rent even of the best soils varies according to the abundance of population in the neighbourhood; large tracts being still waste or under forest. It may be taken at from 1 rupee per *acre* in the more remote parts, to 4 or 5 per *acre*, in the better populated parts of the district.

3. If done by hired labour it costs 7 rupees to 10 rupees per acre, *exclusive* of rent, when cultivated *chowmass*, as the native term is, *i. e.* ploughed during the four months of the rains, without any other crop being taken off it during the season. But wheat is often sown after a crop of the early rice has been cut. Such a crop is in general inferior, but it must be very cheap; and on some of the newly recovered soils, it is as fine as the most laborious cultivation can make it in other places.

4. In the northern parts of Goruckpore, lands lying in low situations are never irrigated for wheat. The higher lands are so if water is at hand, but not more than once, unless the season is unusually dry. In no case however does irrigation appear to be considered indispensable, and it is always practised with caution, being considered to tend to produce the red blight in wheat and barley.

5. It is sown in October, and reaped in March or the beginning of April. I believe about 16 Calcutta bazar maunds per acre would be considered a fair crop, but that half as much again is not infrequent.

6. Barley is often sown with wheat: the mixed grain is called *Goojaee* or *Goojëi*. Surson, or the large yellow mustard seed, is also often sown with it; but the seeds are not mixed, the surson being pulled before the wheat is cut.

7. Probably at from 1 rupee 8 annas to 1 rupee 12 annas. In ordinary seasons the price is generally 1 rupee to 1 rupee 4 annas per Calcutta bazar maund in the markets, and 8 annas more would, I apprehend, be enough to cover the cost to Calcutta.

8. The only kind I have seen in Goruckpore, is a red wheat of rather small grain. It bears a lower price than the doodhee wheat of Behar, but I have understood that it is preferred by the natives generally, as being sweeter in flavor and more wholesome.

*December* 17, 1843.

### *Replies from Benares, by* G. WYATT, ESQ. *Communicated by* D. F. MCLEOD, ESQ.

*Herewith I have the pleasure to enclose a paper of replies by my Deputy Collector, Mr. G. Wyatt, to the Queries of* the Society, regarding the several kinds of wheat grown here; together with specimens of the two principal varieties. I fear these may be too late now to be of service, and regret the paper has been so long delayed, but forward it on the chance of its proving yet in time.

*December* 30, 1843.

1. In the district of Benares, wheat is grown chiefly on the best soils, which are pure clay with a very slight admixture of sand and the alluvion deposits on banks of rivers. The first, when well manured and watered, yields the largest produce, but is expensive:—the other is almost equally fertile, but less expensive to prepare, owing to natural richness of soil and moisture from recent submersion.

2. On an average, 4 rupees per beegah. The beegah is a local measure of land, fixed in this province by regulation, at 3,136 square yards, or 64,793 of a statute acre.

| | | | | |
|---|---|---|---|---|
| 3. One maund seed, at 21 seers, | Rs. | 1 | 12 | 0 |
| Ploughing, 12 times at least, | | 3 | 0 | 0 |
| Two waterings, | | 1 | 4 | 0 |
| Rent to Landlord, | | 4 | 0 | 0 |
| Total per beegah as above, | | 10 | 0 | 0 |

4. Except in "*kachar*," or alluvial land, wheat cultivation is always watered; invariably once and sometimes thrice, according to facilities for irrigation, dependent on depth of water in wells, or proximity of the field to nullahs or tanks, and the means of the cultivator, and abundance or otherwise of previous rains.

5. Sown in all October, and reaped from middle of March to middle of April. Average produce 12 maunds.

6. During the "*rubbee*," or October sowings, are grown,—gram, barley, pease, musoor dal, linseed, surson or mustard, safflower, (*used as a dye, and the seed for oil.*)

### MEMORANDUM.

The enumeration in *justa position*, shews the crops that are grown at the same time, but *not in the same fields with wheat.* Safflower alone is frequently sown with wheat, as the plant is stronger, and takes a longer time to come to maturity. In alluvial soils, however, when the grain is intended solely for the use of the Agriculturist, all these grains are commonly mixed and sown together.

7. The average of the past five years gives the market price of wheat in the city of Benares, as follows: 1st quality 20 seers of 80 Rupees the seer, 2d ditto 22 seers per rupee. The *Muhajunee* allowance of transporting wheat from Benares to Calcutta, is from 28 to 30 rupees per 100 maunds.

8. There are but two distinct kinds of wheat, known as red and white, or inferior and superior. The first is the bearded, and the second the *beardless* wheat; red wheat is less useful than the white; as the latter contains more gluten, and from it are prepared *myda* and *soojee.* It also keeps longer than the red wheat.*

9. One specimen of each kind is herewith sent for the Society's inspection.

GEO. WYATT.

## *Replies from Allahabad and Allyghur. By* J. O. B. SAUNDERS, ESQ.

I had the pleasure of receiving your letter with the queries of the Society regarding wheat. I am rather hurried preparing for my departure to Allyghur to-morrow, but send you replies drawn up as well as I can, though rather in haste. From Allyghur I shall send you samples of the wheat of that district. I fear they will reach you too late for your purpose. My reply to the 3rd Query as to the cost of cultivation, assumes the lands to be cultivated by hired labour; but to the farmer engaged in the cultivation of all the crops of the country with his own implements and feeding his own cattle from the produce of his own land, the expense is by no means so much. It would take me some time to obtain the requisite information to give a good estimate of this, which is however the correct method of estimating the cost of production to the ryot. The price currents of the several districts for some years past would perhaps be as useful a document as this, for the object the Society has in contemplation. I do not think the cultivation of wheat can be extended beyond what it now is in the Doab, in consequence of the poverty of the people, the effect of the present unfortunate revenue system superadded to bad seasons, and the successful competition of other countries in the production of the only staples of export of the Doab,—cotton and indigo; unless indeed the long-talked of Ganges canal was completed, which would not only admit of extension, but would enable the cultivator to produce wheat much cheaper.

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* This I think must be a mistake, and is not admitted by the Natives with whom I have communicated.—D. F. McL.

I propose returning to this place about the end of January; in the mean time I remain at Allyghur, from whence I shall be happy to give you any further information I can obtain.

*Allahabad, 25th November,* 1843.

## ALLAHABAD.

1. The soils preferred for wheat are clayey, and the alluvial lands, (Cachar) of the Ganges, which are principally of strong clay, inundated every year.

2. The rent paid by the ryot for good high land is five rupees per beegah, and six to seven rupees of the *Cachar* lands; the beegah is 3,025 square yards.

3. The cost of the wheat cultivation where all labour is hired, is 17 rupees and 8 annas for the high lands, which require more irrigation. For the *Cachar* lands 6 rupees, the produce of which is considered to be of inferior quality.

4. The high lands three to four times, as the season may require; the low lands once or twice; many of these do not require irrigation.

5. Sown early in October and reaped in March; good produce estimated at sixteen Calcutta bazar maunds, but the return is oftener less than more.

6. Only in the inferior lands is any other seed grown along with wheat, generally mustard or safflower.

7. Wheat sells ordinarily in this district at twenty to twenty-two seers local weight per rupee, or twenty-seven to thirty and three-quarter Calcutta bazar maunds; at this rate wheat would cost 2 rupees and 4 annas to 2 rupees and 8 annas per Calcutta bazar maund landed in Calcutta, including bagging, exchange and insurance; a demand arising for export of any consequence, would raise the price immediately.

8. There are three descriptions of wheat grown in this district: the red, the white, or *doodee*, and the *moowoah*, a wheat without beard; of the latter very little is grown: the white is the favorite. The ryots very often sow the red and white wheat seeds mixed through indifference.

I have the pleasure to send by dāk banghee, a sample of each quality.

I find there is another kind of wheat grown on the banks of the Jumna called *kutea*, a coarse, large grained wheat, considered inferior, and sells somewhat lower than the others. I have not been able to obtain a sample of it at this moment to send along with the others.

## ALLYGURH.

1. The soil of this district is light, and rather sandy.

2. The rent is one rupee to 1 rupee and 4 annas per cutcha beegah for the best lands; about 900 square yards.

*3. The cost of cultivating by hire would be 6 rupees, including seed and rent.*

4. The land is irrigated four or five times.

5. Sown in the end of October and beginning of November, reaped in April.

6. Mustard is almost always sown with it.

7. Wheat sells in this district at twenty-eight seers per Calcutta bazar maund, and would cost nearly 2-12 per Calcutta bazar maund in Calcutta.

8. The red wheat is almost the only kind grown, there is a small cultivation of *doodee*, the impression being that the former is much more productive in the field, and less subject to suffer from frost and blights; the white sells a little higher than the red, the difference being one seer in the quantity sold per rupee.

## *Replies from Lucknow, Fyzabad, and the Central District of Oude. Communicated by Captain* G. E. HOLLINGS.

I have the pleasure to acknowledge the receipt of yours of the 17th instant, and in reply, to forward the answers that I have been able to obtain regarding the cultivation of wheat, in the immediate vicinity of Lucknow. I have had the questions forwarded by you properly translated, and intend to send copies to different districts in Oude, and will send the replies with as little delay as possible.

I might as well state here, that the great grain districts are in what is called the Ganjur country, (literally low lands,) situated between the Chaka river and the Gogra, and from the Gogra to the Teraee.

You may recollect, that in one of my first letters I promised to supply you with such information as my personal experience afforded, or I could collect from what I considered authentic sources, regarding the Agricultural capabilities of Oudh, but I have found so much more difficulty in making out the paper than I had anticipated, that I have *hitherto been unable to fulfil the promise*; *you may however* rest assured, that I will do so as soon as possible; for I am of opinion, that the two most important points to be considered in the consolidation of our Indian empire are, the encouragement of *one* language to be used throughout all our possessions, and the development of the natural products of the soil; always supposing that efficient measures have been, or shall be adopted for the security of life and property, towards the accomplishment of which the recent appointment of uncovenanted Magistrates in Bengal, is a most important step.

I hope to be excused for introducing subjects which may by some be considered extraneous to the point immediately under discussion; but I have so accustomed myself to associate all the subjects that I consider of nearly equal importance as regards the rulers and the people of India, that I find it nearly impossible to confine my attention to a single point. To return to the growth of wheat. I beg to state that the land near the city of Lucknow, from its position and the avoidance of expense of carriage, affords great advantages for the cultivation of all articles of consumption required for the daily use of its comparatively enormous population, and consequently is subjected to a higher rent than that of the more distant provinces. But it cannot be disputed, that the assertion of a correspondent of the *Calcutta Star*, backed by the opinion of the Editor, regarding the superior fertility of the Trans-Gogra provinces, which extend through the Teraee to the Nepal frontier, is perfectly correct. To give you some idea of the difference, I need only mention, that I have myself purchased at Toolseepoor, which is a district on the Nepal frontier, wheat at fifty seers of ninety-six rupees each seer, and gram at fifty-four seers per rupee, when the former grain was selling at seventeen, and the latter at twenty seers for the rupee at Lucknow. I was in or near the Teraee in May 1839, at different periods from April to November 1840, and from the commencement of March to the end of May 1841.

The returns which I hope to be able to forward to you in a month or six weeks, will show what the difference of production now is. In the mean time, I beg to suggest, that if a body of merchants, assured of protection by the British Government, were to send properly qualified persons to the jungles in the vicinity of the Khyreeghur and Khunchenpoor districts of Oude, they would be able to purchase all the materials for boat building at very moderate rates; the iron is supplied from Nepal, and forest trees, *sissoo, sakoo* and *toon* of every description, properly seasoned, could be procured to any extent; there would be no deficiency of materials to make sails and ropes, and grass for *chappahs* could be obtained without the slightest difficulty. The river Gogra passes through the most productive country in India for grain of every kind, hemp, and opium! As immense herds of cattle are pastured in the neighbourhood of the Teraee, a most profitable trade could be carried on in horns and hides; in addition to which, the finest sugar can be procured in some parts of the Oude dominion. The capital of Oude is unfortunately situated on the Goomty, a river which affords very trifling advantages with regard to navigation and commerce; but I am convinced that any of our river Steamers could go up the Gogra quite through the Oude dominions, and as far as the frontier of the Shahjehanpore and Bareilly districts. The boats built at Khyreeghur, or Khunchenpoor, could drop down the river Gogra, and take in their cargoes of grain at any station on the banks. The most favorable position for a general magazine would probably be Secrora, because there is a large market at that station, and all the products of the districts in or near the Teraee are brought to it; besides, it has the advantage of water communication with the Gogra.

I have sent for samples of wheat from different parts of Oude, which shall be forwarded to you as soon after receipt as practicable.

Before concluding this letter, I beg to assure you, that as far as the collection of information goes, I shall always be really happy to render myself useful to the Society, which, I am firmly convinced, in spite of the damper that has been thrown on its exertions by the withdrawal by the Indian Government of the power of franking letters and parcels of seeds, will prove of infinite benefit to the country: and so long as I am associated with it, I shall consider it my duty to be one of its active members.

*Lucknow, 26th November,* 1843.

### *Replies from Lucknow.*

Rich arable land, called by the native *mutteearah*, which retains water, is the best for sowing wheat; but it is necessary to apply manure to it. Water that is brackish, or taken from tanks or rivers, is better for such ground than common well water.

The rent for such ground as is described above, is at the rate of eight rupees per beegah of sixty yards square.

The cost for cultivating wheat land, including seed and rent, is 23 rupees 10 annas 8 pies per beegah, namely:—

| | Rs. | A. | P. |
|---|---|---|---|
| Rent, ... ... ... ... ... | 8 | 0 | 0 |
| One maund of seed equal to 48 Calcutta seers, ... ... ... ... | 1 | 10 | 8 |
| Irrigating four times, that is, once a month during its growth, ... ... | 5 | 0 | 0 |
| Ploughing, &c. ... ... ... ... | 9 | 0 | 0 |
| Total, ... ... | 23 | 10 | 8 |

Wheat is sown in the middle of the month of *Kartick*, about the end of October, and reaped in the middle of *Choit*, about the end of March. The extent of crop in Calcutta bazar maunds to be expected from such land, is 24 maunds, or 20 maunds Lucknow weight, the value of which is, ... ... ... Co's Rs. 23 5 4

Mustard, from which oil is extracted, is sown with wheat, about half a seer in a beegah, and nearly three maunds may be expected as a crop, which may be valued at 7 or 8 rupees, exclusive of what is obtained from the sale of wheat.

Good wheat from Lucknow could be landed in Calcutta at the rate of 24 seers, Calcutta weight, for a rupee, according to the following calculation:—

| *Expense of sending* | Rs. | A. | P |
|---|---|---|---|
| 1000 Lucknow maunds of wheat to Calcutta, prime cost, ... ... ... | 1,666 | 10 | 8 |
| Boat hire and servants, ... ... | 200 | 0 | 0 |
| Insurance and contingent expenses, ... | 133 | 5 | 4 |
| Total, ... ... | 2,000 | 0 | 0 |

As 1000 Lucknow maunds are equal to 1,200 Calcutta ones, the wheat could be landed in Calcutta at 24 Calcutta seers for a rupee. It will be observed, that I have only mentioned the prime cost and expenses of conveyance; a fair allowance must be made for the merchant's profits, before it can be ascertained at what price wheat could be sold in Calcutta.

Two descriptions of wheat are grown in Oude; white, called by the native *seeata;* and red, which is called *lullia*. The white wheat is much preferred to the red.

### *Answers regarding the cultivation of Wheat at Fyzabad.*

1. *Muteearee* ground which is not sandy, is useful for sowing wheat.

2. Rent for a pucka beegah of land, is 7 rupees 8 annas: sixty square yards make a pucka beegah.

3. The cost of cultivating land for wheat including seed and rent, is as follows:—

| | Rs. | A. | P. |
|---|---|---|---|
| Ploughing, (thirty times,) ... ... | 2 | 0 | 0 |
| 20 Seers of seed, ... ... ... | 0 | 12 | 9 |
| Rent, ... ... ... ... ... | 2 | 8 | 0 |
| Manure, ... ... ... ... | 0 | 8 | 0 |
| Irrigating, ... ... ... ... | 0 | 10 | 0 |
| Cutting and separating grain from straw, | 0 | 14 | 3 |
| Total, ... | 7 | 5 | 0 |

4. Such ground as is described above, is irrigated twice from the time of sowing till harvest.

5. Wheat is sown in the month of *Kartick*, (the middle of October to the middle of November,) and cut in *Choit*, (last half of March and first half of April,) seven maunds thirty-two seers and three chattacks of crop in Calcutta weight is expected from a beegah of land.

6. Barley and peas are mixed with wheat crops.

7. If the wheat sent from Fyzabad be sold at Calcutta at the rate of twenty seers two chattacks, (in Calcutta weight,) per rupee, it will bring neither loss nor gain.

An account of expenditure for conveyance of wheat from Fyzabad to Calcutta and the value:—

| | Rs. | A. | P. |
|---|---|---|---|
| 500 Maunds of wheat, Lucknow weight, purchased at the rate of 25 seers per rupee at Fyzabad, ... ... ... | 800 | 0 | 0 |
| Boat hire, ... ... ... ... ... | 230 | 0 | 0 |
| Loading wheat on the boat and oil for light, | 3 | 0 | 0 |
| A Sepoy's Pay, ... ... ... ... | 15 | 0 | 0 |
| Custom on account of Permit, ... ... | 40 | 0 | 0 |
| Ditto to pay the Zemeendars and others on the road, ... ... ... ... | 75 | 0 | 0 |
| Total, ... ... | 1,163 | 0 | 0 |

N. B.—500 maunds of wheat in Lucknow maunds, or 585 maunds 14 seers 1 chattack in Calcutta weight, sold at the rate of 20 seers and 2 chattacks per rupee at Calcutta, makes 1163 rupees, as mentioned above.

N. B.—The above account was furnished by a native who did not know the purpose for which it was required. The items for boat hire, sepoy's pay, permit and Zemeendaree appear extravagant, and as the bank of the Gogra opposite to Fyzabad belongs to the Company, arrangements might be made to reduce the expense of carriage. It will probably be sufficient for those who are interested in the growth of wheat in India, for the purpose of supplying the English market, to know, that the price for which wheat can be grown at Fyzabad, which is situated on the Oude frontier, is 25 Lucknow seers of ninety-six rupees weight each, for one rupee. (True Translation,)

G. E. HOLLINGS.

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## *Answers regarding the culture of Wheat in the Bairswarah or central district of Oude, situated between the Ganges and Goomty, to the South and West of Lucknow.*

Wheat is sown in three kinds of land in this part of the country.

1. *Muteearee*, which if close to a village, is called "*gohan*," and is easily irrigated and manured; and if far from the village, is named "*burhut*," and water and manure are procured with great difficulty.

2nd. *Domut*, and 3rd *bhoor*, which are most valuable when they are close to the village, because they are easily irrigated and manured.

The rent for a beegah of *muteearee* land of the 1st kind, 5 rupees; 2nd, 4 rupees; and 3rd, 3 rupees.

Ditto *domut* of 1st kind, 6 rupees; 2nd, 5 rupees; and 3rd, 3 rupees.

Ditto *bhoor*, 1st kind, 2 rupees; 2nd, 1 rupee; and 3rd, 8 annas.

The *muteear* and *domut* land where vegetables are sown, rent from 8 to 16 rupees per beegah, and the *bhoor* land from 3 to 5 rupees; sixty square yards make a beegah.

The cost of cultivating a beegah of wheat land, including seed and rent, is as follows:—

*Muteearee Land.*

| | Rs. | A. | P. | | | |
|---|---|---|---|---|---|---|
| Rent, ... ... | 5 | 0 | 0 | | | |
| Ploughing, .. ... | 2 | 12 | 0 | | | |
| Seed, 40 seers, ... | 2 | 0 | 0 | | | |
| Coolies, ... .. ... | 0 | 6 | 0 | | | |
| Watering, ... ... | 3 | 12 | 0 | | | |
| | | | | 13 | 14 | 0 |

*Domut Land.*

| | Rs. | A. | P. | | | |
|---|---|---|---|---|---|---|
| Rent, .. . .. | 6 | 0 | 0 | | | |
| Ploughing, ... ... | 2 | 12 | 0 | | | |
| Seeds, ... .. | 2 | 0 | 0 | | | |
| Coolies, ... . ... | 0 | 6 | 0 | | | |
| Watering, ... ... | 3 | 12 | 0 | | | |
| | | | | 14 | 14 | 0 |

*Bhoor Land.*

| | Rs. | A. | P. | | | |
|---|---|---|---|---|---|---|
| Rent, ... ... ... | 2 | 0 | 0 | | | |
| Ploughing, ... ... | 2 | 0 | 0 | | | |
| Seeds, ... ... ... | 2 | 0 | 0 | | | |
| Coolies, ... ... ... | 0 | 12 | 0 | | | |
| Irrigating, ... ... | 2 | 0 | 0 | | | |
| | | | | 8 | 12 | 0 |

If there is rain in the month of *Ughaun*, (half November and half December,) such lands are not irrigated; and if not, the *muteearee* and the *domut* lands are irrigated three times, but the *bhoor* only twice. Wheat is sown in the middle of the month of *Kartick*, (October,) and cut during the month of *Choit*, (March.)

Fifteen maunds of crop in Calcutta weight is expected from the *muteearee* and *domut* lands, and eight maunds from the *bhoor* ground per beegah. Grain (or *chuna,*) barley, and pease, are mixed with wheat crops.

(True Translation.)

G. E. HOLLINGS.

## *Replies from Agra.* *By* H. HAMILTON BELL, ESQ.

Your circular letter requiring such replies as I could give to several queries respecting the cultivation of wheat in these provinces, reached me when absent from home, and without the ability of referring to some memoranda I had made on the subject, and subsequently, occupation during the indigo season, prevented my acknowledging and replying fully to your letter.

The districts with which I am practically acquainted, are Allyghur, Mynpooree, Muttra, Etawah, and Agra, on the left bank of the Jumna. In all of these, there is considerable diversity of soil, and much difference in the productive power of the land; but so far as my observation and enquiries go, excepting in rare instances, there is little selection of soil for the cultivation of any description of grain further than that of the *rubbee* crop. Wheat is invariably sown in the lands which admit of irrigation, whilst barley and gram are frequently sown when this is impracticable. The relative proportions of irrigated and unirrigated land vary considerably throughout the districts; but generally, the whole of those enumerated are very well off for water on this side the Jumna. When the well water is brackish, wheat is sown above the general proportion, the produce being considerably larger and less subject to blight; but this land cannot be cultivated unless the rains have been sufficient to admit of the seed germinating without irrigation from the wells. I have no chemical knowledge of the component parts of the soil.

The natives generally class it, as *bhoor* or sandy, *muttyar*, a good stiff soil, and *chiknoh* or clay, and these have several subdivisions dependent on the proportion of sand or clay. In Mr. Mansell's able report on the late settlement of zillah Agra, the analysis he procured is said, though not minutely accurate, to afford a fair general character of the component parts of the soil. *Bhoor* is thus described as consisting of 7-10 silex, 3-10 alumina and little vegetable matter; *muttyar*, 6-10 silex, and the rest alumina and vegetable matter; and *chiknoh*, 1-3 silex, a small proportion of carbonate of lime, and vegetable matter. The first of these soils is light, but not unfertile by any means, and yielding good crops of the *khureef* grains. The two latter are more suited for the *rubbee* crop of wheat, &c.; but all are indiscriminately used if irrigation exist.

It is not easy to specify the rent per beegah of any particular *khet*, (piece of land,) as it is very much the practice to include the whole of a ryott's cultivation in one pottah at an average rate, assigning him some land near the village, some at a medium distance, and some towards the boundary. In my best villages, this scarcely exceeds 1 rupee per cutcha beegah, of 8268¼ square feet, something less than 1-5th of an English acre, and I should think this (at 1 rupee and 4 annas,) a not very unfair average for wheat; as in the latter lands near the village, where the rent would of course be highest, if let singly, a double crop is frequently, if not generally, taken. For example, near Omerghur, indigo sown in April and May, and cut in August or September, is generally followed by wheat or barley, sown in November, and cut in March.

The cost of cultivation of wheat cannot be confidently stated. Hired labor is not general, or even common. Frequency of ploughing is thought of great consequence in wheat crops, and this may vary from 6 or 7 to 20 times under favorable circumstances of weather. If done by hired labor, it would cost 1 anna per cutcha beegah each ploughing; but such rate can hardly be assumed as part of the cost of productions to a *kisan*, who performs the work himself, and who, if not thus engaged, would pass his time in idleness. Some of the lower castes in addition, use a good deal of manure, carried on the head in baskets. The higher castes will not do this, and it is therefore difficult to state any particular practice as general, though more or less prevalent according to the caste and means of the cultivator. The proper quantity of seed is considered to be 10 local seers=to about 25lb. English per cutcha beegah of 8268¼ square feet; but the poorer cultivators frequently diminish this about 1-3d. Since the famine year, which I exclude, I should imagine 23 to 25 seers of 510 rupees to the *pansera*, the average village price of wheat, and previously to that, 30 to 35 local seers since my residence in these provinces; though varying more than one would suppose, from greater or less proximity to considerable markets of consumption. At 25 seers per rupee, the seed would therefore cost rather less than 6½ annas per cutcha beegah. After frequent ploughing, weeding is scarcely required. From three to five waterings are generally given according to the ability of the *kisan*, and dependent in some degree, of course, on the weather, which sometimes is rainy for a few days in December and February, and according to this is the out-turn of the crop. I may remark here that irrigation is far more conducive to fertility than rain water. I do not know how to state this as a money charge; for a cultivator cannot get it done for him by hire. When it has been a great object for me in my indigo and cotton cultivation, I have sometimes, in my own villages, induced the people, reluctantly, though unenforcedly, to assist me at from 4 to 8 annas per cutcha beegah; but have been frequently absolutely refused by those who know I should not resent their conduct. One pair of good stout bullocks will, near me, where the water is about 32 feet from the surface, irrigate 15-20 of a cutcha beegah per diem, requiring one man, woman or lad to the bullocks; one man to the leather bucket; and one to distribute the water equally to the different beds. I may mention here, that it is much the practice when the soil contains saltpetre, or when the manufacture of the article has prevailed, to scatter the saltpetre earth, broad cast, over the young wheat when about 4 to 6 inches high, and this beyond all question, is of great importance. The plant is more healthy and vigorous, less liable to blight, and considerably more productive. The wheat is always cut, partially, by hired labor. This is almost invariably paid for in kind, either so many seers per beegah, or the 20th sheaf. It is difficult to estimate this in money, but the charge may be excluded from any calculation by diminishing the crop 1-5th.

The ryotts begin to prepare the lands for wheat according to the previous crop. If there have been joar, bajro, or cotton, the ground is clear of them in November, December, and January; and this is subsequently ploughed as rain may happen to fall, and during the rains when the *kisan* has leisure, and the soil admits of the operation. These lands always afford the best crops, and yield an average of 3½ to 5 local maunds per cutcha beegah, (and land well cultivated when the saltpetre earth broad cast is used, rarely less than the last,) or about 360lbs. to 510lbs. English weight. When wheat is sown after an early *khureef* crop from the land, the return is diminished certainly 1-3d, and, perhaps, nearly one half. A much larger produce than this is sometimes obtained, and in my memoranda I have returns, on which I believe dependence may be placed, as high as 10 local maunds per cutcha beegah, equal to 1020lbs. English, *or about 83 bushels per acre!* In villages where part of the lands are of such fertility, the fields are let separately, and the rent is from 2 rupees and 8 annas to 3 rupees per cutcha beegah. From one of these I send you a small sample of last year's wheat, which is rather injured by the weevil, and a small quantity of the earth from one of the *kets*, dried in the sun and pulverized, lest you should wish an accurate analysis.

The best ryotts rarely sow any other seed with the wheat, with a not uncommon exception of a line of mustard at varying distances, perhaps generally 20 yards. The leaves of this are gathered as green fodder for the cattle, the chief inducement, I imagine, to the cultivation, and the stalk remains to flower and go to seed, gathered after the wheat is off the ground. In almost every village there are some few *khets* in which barley and wheat are sown intermingled, but not to a great extent.

The price of wheat in this part of the country, I have already stated to be about 32 local seers, or nearly 1 Calcutta bazar maund per rupee in fair seasons, in which the produce of the *khureef* crop is the most influential regulator of the market. I have never dispatched any to Calcutta, but I have sent down mustard seed; and examining the same charges, these would, as nearly as may be, amount to 1 Rp. per Calcutta bazar maund. It is therefore extremely unlikely that wheat will ever be sent from hence, unless, at the lowest rate, 2 rupees per maund can be relied on. There seems little surplus produce under common circumstances, and an external demand would advance the price, even if of very moderate extent. The usual average price pays the cultivator, of course, but I do not suppose above the common returns of capital. I should remark, that any estimate of monied cost to the cultivator is very fallacious; a great proportion of the ryotts cultivate on advances of seed, cattle, and subsistence, or at all events some one of these. The first is given at a premium of 25 per cent. added to the cost price of the day, and repaid in grain at a small allowance in favor of the lender, or a rate fixed on a particular day, when the probable out-turn of the crops may be estimated. I should imagine, that 1½ for 1 in kind is a very light average. *Tukka-*

*wur* is a money charge, and in this cattle may be included, settled from the crop at the same advance of 25 per cent. The whole of these vary according to circumstances and the condition of the village; but they are exacted when ryotts are in excess, and remitted when tenants are scarce; according as the parties may agree. There are also a variety of *hukks* of different members of the old village communities, (as carpenter, blacksmith, &c.) yet in nominal existence; and collectively, these would amount to nearly seven maunds per plough, or fifty cutcha beegahs. It does not seem obligatory to employ these people, though the Zemindar usually endeavours to impose this to get his own work done for nothing, and it may be said, that it is merely a payment for service received; but it is specially attached to the cultivation: and besides these, there are a variety of *hukks* for which no consideration is given, all being in fact a charge on the produce, which it would be difficult to guess at, even approximating, as a money charge. In my village, so far as I know, the people are left to their own arrangements; but although they know and waive all such demands, I have no doubt they pay something for this to the Gomashtahs, though I have had no complaint of any exaction. An opinion of the rate at which the *kisan can* cultivate may, however, be formed, from the undeniable fact, that wheat is grown to a very considerable extent in poor and *dofuslee* land, for a gross return of 3 rupees 5 annas and 4 pie per cutcha beegah, assuming the village price at 30 local seers per rupee. From this if we deduct one rupee as the general average rent of such land, we leave two rupees five annas and four pie as the return for seed, labour, and agricultural profits; and this must of course, pay the ryott, or he would relinquish the cultivation. With this fact before us, it is exceedingly difficult to account for the disproportionate monied rents of the superior lands. In those I have noticed, the gross returns of 5 maunds and 10 maunds would be 6 rupees 11 annas and

8 pie, and 13 rupees 5 annas and 4 pie respectively, and yet the only difference in cost of production would appear to be the difference of rent, at the *utmost* stated as 2 rupees.

I am only aware of two descriptions of wheat sown here, and these are frequently mixed. I do not believe there is any difference in the produce per beegah, or price, excepting on an occasional demand and short supply of the white, the flour of which is preferred, from its colour, for some Hindu preparations of food for their festivals. I send musters of each description.

I think you will be struck with the great produce obtained under what is considered generally the very imperfect, certainly quite unscientific, agriculture of this country. There is no doubt from all I can learn, and what I myself perceive, that land to any extent may be met with where the return, on good native cultivation, would be not less than 43 bushels to the acre, allowing 60lbs. to the bushel, and this is far above the average of the North American States, which cultivate so extensively for export. The object of your inquiries, I infer, has advertence to the ability of these provinces to supply an extraneous permanent demand with reference to increased returns for the home markets from this country, when the corn laws no longer paralyze the manufacturing and commercial industry of Great Britain. We have, however, here the petty, peddling interferences in details, of the present revenue system, nearly as pernicious; and till this is got rid of, and the land tax is made permanent, the resources of this country will never be fairly developed.

*28th November*, 1843.

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## *Replies from Agra. By* T. J. Finnie, Esq.

I am glad to see the Agricultural Society taking active measures to extend the export trade of this country by creating a market for its agricultural products, which is the only means by which a stimulus can be given to agricultural improvement. I have long been surprised that the loud cry in England for cheap bread was not hushed by large importations, which, under judicious management, might be made from this, too much neglected, and too lowly estimated dependency of the British crown.

I have the pleasure to inform you, that in addition to my general observations upon the wheat cultivation in a great extent of country through which I have had occasion to travel in India, I have made particular and careful enquiries among the people themselves, who are engaged in wheat cultivation, and I think that when it becomes generally known that a foreign market is open to it, there will be no difficulty in supplying England with all the bread it may desire from India. You cannot depend certainly upon the crop from Allahabad to Delhi, until the means of irrigation is afforded by the completion of the Ganges Canal; but complete that, and the Dooab might be made the granary of England, and also the parts of India that might be visited by drought and consequent famine.

I must apologise for the delay in answering your questions, but it was in consequence of having to visit the interior of the district, which opportunity I took to gather more detailed information than I could otherwise have afforded you. This district must not be considered a fair criterion by which to form an opinion of Indian agriculture, for of all dry places, this is the driest. But such facts as I have gathered, I submit in reply to your questions.

1. Wheat is cultivated in several different kinds of land, distinguished by peculiar native names which differ in almost every purgunnah; but I have observed, and the people say, that the land which contains the most clay is the best wheat land, because it retains its moisture longer than if much mixed with sand. The kind upon which wheat is cultivated in the zillah of Furroh near Agra, is called *domut*,

*chicknah, murloh, kossah, and rotcah,* all of which are so nearly alike, that an ordinary observer would not distinguish them.

2. The ryott pays a rent of from 3 to 3½ to 4 rupees per beegah of 52 yards square, and consequently containing 2,704 square yards.

3. The cost of cultivating wheat land, when the labor is performed by the ryott and his family, is comparatively trifling, being only about 6-8 or 7 rupees per beegah, including seed, and then he can usually make a handsome profit; the yield altogether being usually about 20 rupees: but when *hired* labor is resorted to, if the hire is paid in money at the lowest village rates, the expenses would be 28 rupees: being a loss of 8 rupees. I mention this fact to shew the utter impossibility of even the natives cultivating land at a profit with *hired* labor, and Europeans have to pay higher wages, and are more imposed upon than natives are.

4. The land is irrigated six or eight times during the growth of the wheat.

5. Wheat is sown from the middle of October to 10th or 15th of November, and is reaped during the month of May, extending frequently to the first week in June, and yields from 8 to 12 village maunds.

6. Mustard, or "*surson*" and *teesee* (flax), are usually sown with the wheat.

7. Pretty good wheat can usually be purchased in the villages where it is produced at 1 rupee 4 annas per maund, of 40 seers per maund, and 80 rupees weight to the seer. (I have not the tables to convert it into Calcutta bazar maunds.) It would cost about 8 or 10 annas per maund to Calcutta from Agra, and about 2 annas would bring it from the district to the river, at which rate the Moffussil maund could be landed in Calcutta at 2 rupees per maund.

8. There are two descriptions of wheat grown here, one is called red and the other white wheat; the red is the favorite

among the people, because they say it produces the most grain. The wheat grown east of the Jumna, is better than that grown west of the river, and appears to improve as it advances east, as the Rohilkund wheat is the best I have seen.

9. I have the pleasure to send you a sample of the two qualities produced at Furroh.

*Agra, 30th December, 1843.*

## *Replies from Budaon. By* John Donald, Esq.

I am now able to reply to the questions received with your letter of the 18th ultimo.

1. The cultivators of this district prefer the *doomut* land, containing a mixture of sand and clay, for sowing wheat, but they do not, apparently, confine themselves to any particular description of soil, merely changing the crop from *khurreef* to *rubbee.*

2. About 8 annas per kucha beegah of 1,008 square yards, (4 b. 16 c. go to an acre,) may be taken as the average rent paid. The rates vary, of course, according to the quality of the land, and the industry of the ryots; for instance, the *Moorraos* pay much higher than other castes, as their cultivation lies principally round the villages, and in the vicinity of towns.

3. Per kucha beegah the result will be

| | | | | | |
|---|---|---|---|---|---|
| Seed, 7 : 8, | Rs. | 0 | 4 | 0 | |
| Rent, | | 0 | 8 | 0 | |
| Ploughing, | | 1 | 8 | 0 | |
| 2 Waterings, | | 0 | 8 | 0 | |
| Cutting and thrashing, | | 0 | 5 | 0 | |
| | | | | | 3 Rs. 1 Anna |

yielding from 2½ maund to 3 maund 20 seers of wheat, besides fodder for cattle.

4. If rain falls in December, wheat lands are seldom irrigated, otherwise rarely oftener than twice.

5. Unless the rainy season breaks up late, as was the case this year, the sowings are completed by the end of October in the high lands. Wheat is reaped early in April. I am unable to form an estimate of the crop, as large quantities are imported from the adjoining district of Moradabad. The exportations to Furruckabad, Cawnpore, and Hatras from Bilsie alone, exceed a lac of maunds annually. Large quantities are likewise stored in pits all over the district; it may therefore not be unreasonable to suppose the produce reaches 400,000 maunds, but this is only a guess.

6. A handful of *surson* (Sinapis dichotoma) is thrown on with the wheat to produce oil for the consumption of the cultivator; occasionally wheat and barley are sown together, and the produce called *bijia*, sold to the poorer classes.

7. The heavy charges attending the transportation of grain to such a distant market as Calcutta, leave little chance of remuneration. Cheap as wheat is now selling, 35 to 36 seers, (of 96 weight,) I question whether it could be landed in Calcutta at more than 20 seers per rupee, bazar weight.

8. Two kinds are sown; the *ruttoa* or white, and *kuttea* or red wheat. The former is most esteemed. Samples of each will be despatched by banghy.

*11th December*, 1843.

## *Replies from the Bolundshuhur District.* *By* Thomas Tonnochy, Esq.

I have now the pleasure to reply to the Queries contained in your letter of the 15th June last, as follows:—

*Replies to 1st Query.*—The land on which wheat is grown in this district, and I should say throughout these provinces, may be classed under four heads: the first of which should, from the circumstance of their productive qualities not being referrible to the agency of man, be denominated natural soils: they are the loamy or rich clay, here termed *daukra;* the sandy or *bhoor*, by which is meant the impure earthy sand; and the one in different degrees intermediate to both, termed *seotah.* These three are again divided into first, the *abee*, that is land accessible to irrigation from wells, rivers, tanks, nullahs or other sources; and secondly, the *baranee*, or land altogether dependent, as its name implies, on the periodical rains, not only for producing a crop, but rendering it fit for ploughing and sowing. The fourth description of land (which might originally have been any one of the three preceding kinds,) is composed of the artificial soil lying immediately about towns and villages, created by the washings and deposits from such places, and the repeated manurings, which without much trouble, labour, or cost, the owners are enabled to give it, from the filth which accumulates in the vicinity of all dwellings. This land which is called *barah*, and also *dofuslee*, from its producing two crops within the year, possesses of course the highest productive qualities, and it is always accessible to irrigation from wells and tanks, which are amongst the first to be called into existence on the formation of towns and villages; those qualities are generally brought forth to their full extent.

*Reply to 2nd Query.*—I may at the first state, and that shortly, that the beegah "*kham*" or "*cutcha*," and which is the only one comprehensible by the generality of cultivators, is the one-sixth of an acre. The beegah, however, which is used on all occasions of transfer and official record, is the five-eighths of an acre; it contains 3025 square yards, and is denominated "*pokhta*" or "*pucka.*"

The rent per beegah varies considerably, being affected by too many causes to admit of their being comprehensively treated in such an article as I can, upon the present occasion, write. One great cause, besides that of diversity of soils, may be referred to the amount of competition existent in different places, and depending on the state of population. Another is the character of the people to whom the land is available, and to habits which are in a very material degree operated on by caste, and the prejudices inseparable from it; for while there are whole communities who would consider it degrading for the female members of their families to aid them in out-door work, there are others whose bent lies so entirely in the way of a purely Agricultural pursuit, in forwarding the means of life, that they fully avail themselves of such assistance, and are consequently enabled to overcome the drawbacks, and escape the numerous taxes to which they would otherwise have been subject. Of this class, are the "*Jats*" and "*Lodhas,*" amongst the Hindoos, and "*Jhojhas,*" who are Mahomedans.

The distinction between two such communities as the above, is too broad, as not at once to shew the difference between their abilities to pay equal rent for land of the same description, but situated in their several localities. In order, however, to afford some idea of the general rates of rent, which may be taken to prevail in this district, I begin in the first instance to state, that land is subject to three kinds of tax. The first is a fixed "corn rent," but this is far from prevailing in any great degree, and is altogether confined to detached portions of rent-free land, chiefly lying about cities and towns; the rate of this rent is about one "*ukburee*" maund (27 seers of 80 Company's rupees to the seer grain) per beegah *kham* per annum; paid alternately out of the kinds produced in the *khureef* and *rubbee* harvests; from which it will be seen, that its value fluctuates, not only with reference to the difference between the worth of the products of the two harvests, *i. e.*, between wheat on the one hand, and joar, bajra, and mukka (Indian corn) on the other, but to the state of the market; for the rent in kind, that would bring one rupee when plenty prevailed, would be worth two in a dear season,; so that it will be perceived, that such a description of rent cannot be fixed with reference to any rate in cash.

The second kind of tax is that by which a certain portion of the produce of land belongs of right to the person entitled to buy it, whether under the designation of Proprietor, Zemeendar, Muafeedar, or any other. The proportion so levied varies in different places, being subject to local usages, founded on rights, either heritable or prescriptive, which are enjoyed by the cultivators. With this proviso I may state, that under the system in question, the landlord takes from full one-half to so low as one-fourth of the produce, the intermediate rates being two-fifths and one-third, and his share is levied either by *kun*, *i. e.* estimation of the contents of grain in fields, when the crops having ripened are still standing; or by *butree, i. e.*, actual division of the out-turn in grain, after the processes of cutting, treading, and winnowing have been gone through, but of course before the grain has been at all moved away from the treading ground. No cash value can be fixed for this kind of rent, which it will be clearly seen, is liable to be acted upon not only by the seasons, but the state of the markets.

The third kind of tax is that where the rent is paid in cash; the amount of this is also subject to variation; that is from the local usages above set forth, and the character for industry of the class of cultivators to whom the land is available: but in general the rate per beegah, *pucka* or *pockta*, may be taken to be as fallacious, being what was deduced by me from enquiries which I instituted when about forming the settlement of a portion of this district.

| | Description of Land. | Produce. | Qualities of Soil. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | First. | | | Second. | | | Third. | | | Average of the 3 last Columns. | | |
| For "Abee" or Land accessible to irrigation. | Barra or Dofuslee, .. .. | Cotton and Tobacco, .. .. .. | 12 | 0 | .. | 9 | 0 | .. | 6 | 4 | .. | 9 | 0 | 0 |
| | | Indian Corn and Barley, .. .. .. | 7 | 8 | .. | 5 | 4 | .. | 3 | 8 | .. | 5 | 2 | 8 |
| | | Total, .. .. .. | 19 | 8 | .. | 14 | 4 | .. | 9 | 12 | .. | 14 | 2 | 8 |
| | Land lying beyond the Barra, .. .. .. .. | For produce not capable of being subjected to "kun" and butree, such as Indigo, Cotton, Churree, &c. and therefore subject to cash rent,.. .. .. | 4 | 8 | .. | 3 | 0 | .. | 2 | 4 | .. | 3 | 4 | 0 |
| | | Wheat, .. .. .. .. .. | 6 | 0 | .. | 4 | 8 | .. | 3 | 0 | .. | 4 | 8 | 0 |
| | | Barley, .. .. .. .. .. | 4 | 8 | .. | 3 | 0 | .. | 2 | 4 | .. | 3 | 4 | 0 |
| For "Baranee," or Land not accessible to irrigation. | Khureef Harvest, .. .. | Bajra, .. .. .. .. .. .. | 1 | 8 | .. | 1 | 2 | .. | 0 | 12 | .. | 1 | 2 | 0 |
| | | Moat, .. .. .. .. .. .. | 1 | 2 | .. | 0 | 13 | 6 | 0 | 9 | .. | 0 | 13 | 6 |
| | | Joar, Oord, Mash, &c., .. .. .. | 2 | 4 | .. | 1 | 11 | .. | 1 | 2 | .. | 1 | 11 | 0 |
| | Rubbee Harvest, .. .. | Barley, Gram, &c., .. .. .. .. | 2 | 4 | .. | 1 | 11 | .. | 1 | 2 | .. | 1 | 11 | 0 |

In closing my reply to the 2d query, I beg to draw your attention to the remarkable difference which the above statement exhibits between the *barra* and *abee* on the one hand, and the *baranee* on the other; and when I state that more than the half of this district lies waste, and that the irrigated land amounts to no more than one-fourth of the cultivated area, I at once shew the drawback it labours under, and the great advantages which the present condition of things afford for Agricultural enterprize combined with capital, for the outlay of which, sufficiently long leases could be secured by speculators to insure a full return. It would be perfectly easy to calculate the area that a certain sum expended in the construction of wells would bring under irrigation, and as practical farming and the location of farms would be productive of manure also, the difference between the *baranee* rates of rent, and the *abee* and *barra*, might well be held in prospect, and confidently reckoned upon as the return to the speculator, for the employment of his capital and labour.

*Reply to the 3rd Query.*—In endeavouring to form a data for my settlement, I assumed a pucka plough of four bullocks, to be capable of cultivating 120 cutcha beegahs (32 pucka beegahs, or 20 acres) of land; but as this could not be sown with one and the same kind of grain, and its produce would have to be derived from the two great harvests, the *khureef* and *rubbee*, occurring at two different periods of the year, but the preparation of land for which is simultaneously carried on with the first fall of the regular rains, it will be seen, that the expense attending the ploughing of the whole, the manuring, sowing, weeding, irrigating, cutting, treading, &c. could not be divisible upon any particular portion or produce of that land, without such minute noting and attention, as in all probability have never yet obtained in these parts. All that could be done in the way of arriving at any approximation to the object in view, would be by drawing out an estimate of the cost, produce, and value of the return that would be made by a compact farm of a given magnitude: and even this would be found to convey rather a general idea of eventual results, than the cost of any article of expected produce. I therefore find myself altogether at a loss in answering the first part of the query in question, and with regard to its latter part, the rate of rent has already been stated, and the quantity of seed sown varies with the amount of moisture contained in the soil; but the average may be taken at twelve seers of wheat to the cutcha beegah, or nearly 72 seers to the acre: the seer being equal in weight to 80 Co's. rupees.

*Reply to the 4th Query.*—This query has been partly answered in the reply to the second query. The number of the irrigations, however, which wheat undergoes, may be taken at five for *barrah*, and four for land lying beyond the *barrah*, and this number becomes reduced by the number of times that it happens to rain while the crop is growing and coming to maturity. The popular opinion is, that every artificial watering will enhance the produce by a maund cutcha (27 seers pucka of 80 Co's. rupees) per beegah cutcha.

*Reply to the 5th Query.*—The sowings commence about the middle, and continue to the end of November, and the crop is reaped at the end of March and beginning of April.

The extent of the crop varies relatively to the degree in which the land has been manured, and the number of waterings the crop has received. In *barrah* land, good produce may be taken at 42 maunds, (of 80 Co's. rupees to the seer,) or as many bushels per acre; it is certainly known to be much greater. In land not *barrah* but irrigated, the produce averages from 12 to 18 maunds per acre.

*Reply to the 6th Query.*—The surson oil seed is sown in rows, but widely apart, with wheat. This is taken up long before the wheat, the produce being but a mere trifle—about a maund from an acre. Some descriptions of land are peculiarly adapted for the growth of wheat along with gram or barley, the former is called *guhchunee* and the latter *gojiee.*

*Reply to the 7th Query.*—I am not prepared to answer this question, not being in a situation to ascertain the freight which the conveyance of wheat down the Jumna and Ganges would really amount to. On this point, the creation of the Ganges canal, which will run the full length of the "Doab," will effect a material revolution, and render inseparable the connection of Calcutta with Upper India, in as much as the canal is to be a navigable one. On the progress of this work, which is going on very tardily at present, it behoves both the Agricultural Society and the Chamber of Commerce to rest their especial attention; contributing as it will towards the enhancement of the objects of both the one and the other, and conferring on each an amount of incalculable benefit. Adequate funds being all that is required for the speedy completion of this great work, it would not be amiss were the two great Societies I have named, to recommend to Government the raising of a loan for that express purpose: a loan that cannot fail to be far more popular than any other that has hitherto been raised; and as its outlay will prove a productive one in the taxes which will be derived both from irrigation and navigation which the canal will afford, the loan will entail no loss whatever on the Government, in the payment of its interest.

With regard to the value which wheat bears, I beg to say, that it is now selling at 42 seers (of 80 Co's. rupees to the seer) for the rupee; and should a couple of rains fall after a due interval, it is expected that it will at harvest time be procurable at a maund and a half for the rupee. In connection with prices I beg to say, that the dearth of purchasers of produce, of which wheat is the staple in grain, is so great at present, that the Zemeendars are really unable to raise money upon it for the payment of the Government revenue, and this fact in no small degree evinces the absolute necessity of speedily constructing the Ganges canal, by which alone can a constant opening for her products be ensured to Upper India, and the object of the Agricultural Society of furnishing England with food from India, be rendered feasible.

*Reply to the 8th Query.*—Only two descriptions of wheat, the white and the brown, is grown in this district; samples of these I shall hereafter send. Some persons made a trial of a large grained two-rows kind of wheat brought from Malwa, but it took such a long time to ripen, having been reaped at the end of May, that it was not considered profitable, and therefore given up; besides which, the wheat, however preferable it was found to be for certain modes of cookery, did not make good country bread.

I regret much the negative way in which I have been obliged to respond to your queries, and the little information I have been able to convey on the points contained therein; but my replies as far as they go, will I trust not be found wholly unprofitable, and I shall remain well content, should they contribute in any degree to pave the way for further enquiries in other shapes.

*Boolundshuhur, 1st February,* 1844.

## *Replies regarding Wheat Culture in the Nerbudda Valley.*

*Communicated by Colonel* J. R. Ouseley.

I have much pleasure in sending the replies to queries contained in your letter of 15th instant.

1st. On black rich alluvial soil. The best soil, the valley of the Nerbudda. No wheat is sowed as a staple in the provinces now under my superintendence, Sumbulpore excepted. There are a few fields of bad black wheat grown in every direction; rice is the staple.

2d. This will require longer explanation, for quality of soil, the period it has been in cultivation, and the neighbourhood of a large market affects it; 1 rupee to 2-8 is the rent for wheat land per beegah. The beegah is of twenty biswas, and is about one English acre, that is, seventy yards square, or 4900 square yards, instead of 4840. About 32 " paillees" (or thirty-five seers of eighty tola weight,) make one English bushel. Each acre would require about one and a quarter bushel of wheat to sow it, but as the land varies, so the quantity of seed is apportioned.

3rd. I must go back to the valley of the Nerbudda for a reply here also, and must take it in the form least open to suspicion, a memorandum of my own, the informants respectable, and having no object in deceiving. This statement, also from long experience, I have ascertained to be correct, and I regret that it is so, for it shews that the industry of the cultivator is over-taxed. A plough is used as the standard, and counted as equal to sowing 4 manees of seed,[*] if one in which 4 bullocks are used, but the soil is so rich and stiff at the same time, less than 4 in wheat lands are seldom used; 4 manees, or 20 acres of best land, are therefore tilled with one plough, produce 8 fold, giving 32 manees return, harvested and housed. Which if sold at 4 rupees per manee, at harvest time, gives, ... ... ... Rs. 128 0 0

This is often regulated by " Bundpore," or a committee of landed proprietors, who vote for a price.

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[*] 1 Manee is 24 kooroos, each kooroo 8 paillies, each paille 90 Co's. rupees weight; therefore a manee weighs about 4 maund and 32 seers, 40 seers a maund, 80 tolas a seer ?

| | | | | |
|---|---|---|---|---|
| The charges on 128 rupees are seed with "baree," or interest (fifty per cent.) six manees at four rupees,... ... ... ... | Rs. | 24 | 0 | 0 |
| "Halwah" or ploughman five "manees," | ,, | 20 | 0 | 0 |
| "Oorya," or sower; feeds the funnel of the plough, half manee, ... ... ... | ,, | 2 | 0 | 0 |
| "Churwai," bullock keeper, 2 manees, ... | ,, | 8 | 0 | 0 |
| Bullocks' expenses; feed 4 manees, ... | ,, | 16 | 0 | 0 |
| "Lohar," bullye, burrohie, chamar, nye, "dhobee," sonar, patwary, all village servants, paid in kind, 2 manees, ... ... | ,, | 8 | 0 | 0 |
| Iron, leather, ropes, &c. cost, ... ... | ,, | 4 | 0 | 0 |
| Deduct, ... | ,, | 82 | 0 | 0 |
| From 128 rupees, leaves, ... ... ... | ,, | 46 | 0 | 0 |
| Government rent at Rs. 1-8 per beegah, | ,, | 30 | 0 | 0 |

Leaves for the cultivator Rs. 16, from which he has to support his family, and pay interest on money and any thing extra, to the Malgoojar.

This is a very high average for wheat lands at 8-fold, but a little "scarce" (khurreef rice, &c.) land is thrown into the bargain in general, and the cultivator contrives to exist; to make an average of khurreef is quite useless, it is so uncertain. The rubbee cultivator, must allow for, "teora" (tares) for his cattle, for chenna, (gram or boot,) moosoor, tillie, ulsie, toor, &c. I have taken the above as wheat altogether, no more can be produced in "bunded," or irrigated lands. If the "kirson" works himself as "hulwah," he saves more, but can only manage one plough.

4th. No. No irrigation is used for the best wheat, "jalalia," and "kutya," but in Nursingpoor and Jubulpoor, Bandwas' cultivation is general, that is, the fields are surrounded by high banks, a foot to 3 feet high, which retain the water of the rains. The wheat is however not so good as in the valley of the Nerbudda, beyond Nursingpoor west, and there no irrigation whatever is requisite.

5th. Wheat sown in October or beginning of November, reaped in February or March. One kind of wheat in Baitool called "sat'ya" or sixty days, is said to be ripe within that period from being sowed. The last part of the question is answerable in the third reply.

6th. Very seldom any instance but in new soil, or very old, "birra" wheat and chenna are sown; this is seldom done, and is by no means profitable.

7th. This is hardly answerable, as it would have to go to Mirzapoor by land carriage, and then down the Ganges; say 8 rupees a manee; add duty in Rewah, &c. 2 rupees=10 rupees, or 2 rupees for a maund of 40 seers of 80 tolahs each.

8th. There are several kinds, and I place them in their order as estimated by the people, prices being given:—

*Per manee, or nearly 5 maunds of 40 seers.*

| | | | |
|---|---|---|---|
| 1st. Jalalia, say, ... ... ... ... | 4 | 4 | 0 |
| 2d. Kuthen, ... ... ... ... | 4 | 0 | 0 |
| 3d. Sahaliya, ... ... ... ... | 3 | 11 | 0 |
| 4th. Satya, ... ... ... ... ... | 3 | 8 | 0 |
| 5th. Pissie, ... ... . . ... ... | 3 | 0 | 0 |

Regarding the first, in September 1839, I sent some to Dr. Wallich, who presented it to the Agricultural Society. A Committee pronounced it the best in India. I quote the words of a note of the late Secretary, Dr. Spry: "Some " Hossingabad wheat (Jalalia) which was presented to " the Agricultural and Horticultural Society, of India by " Major Ouseley through Dr. Wallich, and reported on " by a Committee, was pronounced superior to any that the " members had ever before seen in India. It weighed full " sixty pounds to the bushel." You will find the result of the investigation in the Transactions for 1839. I know that in the test of quantity of flour ("soogee") and quality, colour, and taste of bread, it is superior to any I ever saw any where.

It is a source of much regret to me, to find a country of the nature of the Nerbudda valley so neglected in regard to roads. Fifteen or twenty years ago, a road from Jubulpoor to Mirzapoor was made. This is in excellent order, bridged throughout. I have already recommended the continuation of this line through Hoshungabad, Hurda, Asseergurh, (Boorhunpoor) in Khandeish, to Bombay, and with the finest coal fields in India, or probably the world, (the coal having been tried at Bombay on the *India* steamer, and proved to be 83 per cent. better than the best Scotch coal,) adjacent to inexhaustible iron mines. I see not why the road now made to Mirzapoor should not be converted into a rail road, and the rest of the line continued, as I advise. A few engineers and men from the great iron works in England or Wales alone are wanting, since lime, charcoal stone, water, coal and iron are all to be had at one spot, Benar, near Chichely. Surely the energies of our practical men could not be better employed than to apply those resources to making this superb work. The material the property of the Government, and the country through which the road would pass also, would reduce the cost of the road to one-twentieth what it is in Europe.

The country after ascending the Kuttra Ghaut near Mirzapoor, until nearly Boorhanpoor, a level, and then only one ghaut on the Nassuck road, (already finished,) from near Boorhanpoor to Bombay. The line from Mirzapoor to Calcutta is too well known to need being mentioned; all is feasible at small expense comparatively, and ultimately great gain must result in removal of produce, the cotton, wheat, sugar, bulky and immovable, would find their way down. Iron for all purposes, coal for the steamers, conveyance of passengers, cheap and rapid relief of troops across the Peninsula, and every purpose to which it is now applied at home. Great part of the Post Office establishments would no longer be required, and other savings. It is no further in advance of the present state of the country than our other scientific establishments, and no more beyond the means of the Government, than the construction of an ordinary road. But until by the instrumentality of railways, the productions of Central India are transported to the markets of Calcutta or Bombay, it cannot be expected, that the extra qualities will have sufficient inducements for people to pay extra prices, although, like Jalalia wheat, one-third better. This matter deserves to be prominently brought to the notice of the Government.

There are other names for wheat in Central India; for instance, the "doodhia" of Ellichpoor, that approaches nearest to the jalalia. The "moonda" or beardless wheat is also plentiful, and as good as kuttia, No. 2. There are other local names, but they are not for distinct kinds of wheat. Jalalia has the longest beard and straw, and when ripe is a very beautiful, *proper straw* colour. Kutia has a beard, is darker and dirtier looking. Sahaliya is with and without beard, light and agreeable colour. Pissee has a beard, is a coarse, white, bad wheat, by no means nutritious, gives large returns. I shall do myself the pleasure of sending samples as soon as possible.

*Chota Nagpore, June* 20, 1843.

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P.S.—I may as well mention, that on breaking up new land, wheat is not sowed until the 3d year, if good soil, often it is brought under wheat cropping; no alteration of crops takes place, until the soil becomes too weak, in from 10 to 20 years. No manure is given, and no irrigation. The land is ploughed 3 or 4 times in the rains and "bokkered," or harrowed before sowing in October, it then becomes as level as a well raked garden, without hardly any trouble.

### *Replies from Ellichpore. By* DR. W. H. BRADLEY.

I have much pleasure in offering this trifling information upon the cultivation of wheat in this part of India to your acceptance. It is of no particular interest in itself, but may perhaps serve to guide you in your intended communications, as to its value in this portion of India.

About this neighbourhood, black cotton ground is the one preferred for cultivating wheat.

Rent is paid by the ryot, at the rate of twelve annas a beegah.

The total cost of cultivating a *nathan* of wheat, would be as follows:—

| | | | |
|---|---|---|---|
| Ploughing, ... ... ... Rs. | 6 | 0 | 0 |
| Harrowing, ... ... ... ... | 3 | 0 | 0 |
| Seed and sowing, ... ... ... ... | 2 | 0 | 0 |
| Rent, ... ... ... ... ... | 6 | 14 | 0 |
| Total, ... ... | 17 | 14 | 0 |
| Value of crop, deducting expense of reaping, | 33 | 0 | 0 |
| Profit, ... ... ... ... ... | 15 | 0 | 2 |

Wheat is sown here immediately after the monsoons. No other moisture is needed than the heavy dews. When however it is unseasonably sown, twice a week irrigating is considered sufficient, which is continued till the ear swells and arrives at perfection.

The usual time of sowing is early in October, and is reaped early in March. The crops run upon an average about four *kandees* (of 320 seers) to a *nathan.*

It is unmixed with other crops.

Wheat is now selling here at fourteen annas and eight pies a maund for the best sorts.

Three varieties are cultivated in the Berar valley, the *bunsee*, the *cutteah*, and the *poaltiah.* The first of which is the best, and makes the finest flour; the two latter are apt to form heavy and indigestible food.

Samples of each are sent.

Wheat constitutes the staple food of many of the inhabitants of Berar, in some parts of which it is most extensively grown, as around Oomrowtee, Mana, Koorun, and Mootoozapoor. Large supplies of the grain are also admitted from Malwah, Baitaol, Hussinghabad and Rawulpoor.

*Ellichpoor, 18th November* 1843.

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*Memoranda of the Expense of hand-cleaning Maunds* 21,288 *of Doodea and Gungajelly Wheat.*

| Description of Wheat. | No. of maunds bought. | No. of maunds of cleaned Wheat produced. | No. of maunds of light Wheat separated. | No. of maunds of dust taken out. | Avrg of light Wheat per md. on the quantity bought. | | | Average of dust per maund on the quantity bought. | | | Total average per maund of light Wheat and dust taken out. | | Cost of hand-cleaning per maund. | Cost of other charges per maund. | Total charge per maund. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mds. | Mds. | Mds. | Mds. | Mds. | Srs. | Chs. | Mds. | Srs. | Chs. | Srs. | Chs. | Annas. | Pice. | Annas. |
| Doodea, .... | 273 | 232 | 25 | 16 | 0 | 3 | 10½ | 0 | 2 | 5¾ | 6 | 0¼ | 1 11¾ | 6 4 | 2 6 |
| Ditto, ..... | 503 | 492 | 11 | 7 | 0 | 0 | 14 | 0 | 0 | 9¾ | 1 | 7¾ | 2 9 | 6 0 | 3 3 |
| Ditto, ...... | 168 | 119 | 25 | 24 | 0 | 5 | 15½ | 0 | 5 | 12 | 11 | 11½ | 3 0½ | 6 0 | 3 6½ |
| Ditto, ...... | 3,753 | 3,036 | 612 | 105 | 0 | 6 | 8 | 0 | 1 | 2 | 7 | 10 | 2 10 | 6½ 0 | 3 4½ |
| Ditto, ...... | 777 | 724 | 42 | 11 | 0 | 2 | 2½ | 0 | 0 | 9 | 2 | 11½ | 1 4½ | 4 0 | 1 8½ |
| Gungajelly, | 8,219 | 7,974 | 7,020 | 173 | 0 | 0 | 5½ | 0 | 0 | 13½ | 1 | 3 | .. .. | .. .. | .. .. |
| Ditto, ...... | 5,912 | 5,492 | 325 | 95 | 0 | 2 | 3 | 0 | 0 | 10¼ | 2 | 13¼ | 1 3¼ | 4½ 0 | 1 8 |
| Ditto, ...... | 1,683 | 1,600 | 41 | 42 | 0 | 1 | 0 | 0 | 1 | 0 | 2 | 0 | 0 5½ | 4 0 | 0 9½ |
| | 21,288 | 19,669 | 1151,20 | 473 | | | | | | | | | | | |

Bought Maunds 21,288 of Wheat, gave 19,669 of cleaned Wheat, and 1151·20 maunds light Wheat, Gram, &c.; also 473 maunds of dust and dirt.

*Cossipore Mills, 10th December*, 1843.

Wm. Haworth.

### *Memorandum of* 48 *Boats of Dhoody Wheat, purchased by* CHARLES SARSON *at Monghyr, in the year* 1840.

**60,453 maunds of Dhoody Wheat**

| | Rs. | As | Ps. | Rs. | As. | Ps. |
|---|---|---|---|---|---|---|
| **Prime cost of ditto,** ... .. | | | | 69,039 | 4 | 6 |
| **Charges on ditto; viz. Boat Hire, Mats, Coolies, Loading, Peons' Wages, Toll, &c.** .. | 8,349 | 2 | 0 | | | |
| **Native Establishment,** .. .. | 1,265 | 15 | 6 | | | |
| **Petty Charges,** .. .. .. | 61 | 1 | 6 | | | |
| **Post Office,** .. .. .. | 21 | 13 | 6 | | | |
| **Office Charges,** .. .. .. | 12 | 5 | 6 | | | |
| **Law Charges,** .. .. .. | 18 | 12 | 6 | | | |
| **Stamps,** .. .. .. .. | 17 | 0 | 0 | | | |
| **Brokerage,** .. .. .. | 258 | 14 | 9 | | | |
| **C. Sarson's Commission,** .. | 2,027 | 8 | 0 | | | |
| | | | | 12,032 | 9 | 3 |
| | | | Rs. | 81,071 | 13 | 9 |

Averaged throughout, including all charges, 1 rupee 5 annas per maund.

The purchases took place between the months of April and December.

C. SARSON.

*Calcutta, 6th November*, 1843.

***h-Western Provinces of India.***

## *Report of the Wheat Committee, on the introduction of Indian Wheat into British Ports, on an equalized duty with the production of Canada.*

In entering on a report of the information we have before us respecting the question of the introduction of Indian wheat into British ports, on an equalized duty with the production of Canada, which information is digested in the tabular statement herewith submitted, to which this report may be considered as an appendage, your Committee deem it desirable, with a view to its clearer elucidation, to class the subject under the following heads:—

1st. The information as regards the agricultural view of the question.

2nd. Such as refers to the ratio of production in the several districts.

3rd. The cost of producing, and the profit derivable by the grower and speculator.

4th. The practicability of exporting the wheat when produced.

1st. *Agricultural View.*—The article appears to be produced generally on two descriptions of soil, the stiff clayey tracts of high land never inundated, and the light sandy alluvions that are changing every year; but we have not any means before us of testing the relative value of each for the growth of wheat, or the relative extent of each available to this object. The time best adapted for sowing wheat in all parts of the country appears to be the month of October, being the period when the lands are recovering from that excess of moisture consequent upon the periodical rains. In the course of its growth on the higher lands, it would appear to require irrigation, so as to keep up a supply of moisture not naturally to be found in the soil; but an opinion prevails that the more irrigation is resorted to, the less valuable in quality is the produce, and that wheats deriving their sustenance only from the natural moisture of the soil, are superior in quality to those assisted by irrigation. It remains, however, yet to be proved, whether this difference arises from the act of irrigation, or is traceable to the component parts of the soils themselves, the irrigated crops being those on high clayey lands, and the non-irrigated ones being alluvion. The period of reaping too is the same in the several parts of the country from whence we have returns, ranging between February and April, according as the crop is forward or otherwise. A great error in the cultivation of this article prevails all over this country in the admixture of other crops with wheat;* but this being the case with almost every other articles of culture by the natives, it would be exceedingly difficult to effect a reform, and could, in all probability, only be accomplished gradually by the purchasers for export, steadily rejecting such wheat as was at all mixed with other grain.

It is unnecessary in this report to comment on the mode of Agriculture in this country, or to point out the improvements that might be made in it; suffice it to say, that great benefit would accrue to native Agriculture at large from improving the rotation of crops, and that we may fairly hope to see a great extension of cultivation of wheat as soon as we have a wide market open to it. Some of the finest wheat countries are to be found in the vicinity of our Calcutta market; but beyond Behar, the distance would appear to be too great to allow of a profitable import at the present high rates of transport. Besides this consideration, it may be observed, that the places beyond that province are wheat-consuming districts, and the residents have consequently less reason or desire to transmit it to another market. It appears therefore probable, that the chief export to Great Britain must be from the eastward and southward of Patna.

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* An exception is to be made in the case of the Saugor and Nerbudda territories, where, as we learn from the report of Colonel Ouseley, other crops are very seldom sown with wheat.

*2nd. Ratio of Production.*—Coming to the second point, or that which refers to the ratio of production, we find, on reducing the measurement to one uniform standard, the Bengal beegah of 14,400 square feet, that the general average in the tabular statement ranges from 6 to 7½ maunds per beegah. It has been proved, however, from the returns received by your Committee, that this may be greatly enhanced.

*3rd. Cost of producing and profit derivable.*—The next division of the subject brings us to the consideration of the profit to be derived from the culture as a speculation. The cost of cultivation would seem to decrease in proportion as the article is grown nearer to Calcutta; for we find that about Bhauglepore, Goruckpore, &c. the outlay would be from rupees 2 to rupees 5 per Bengal beegah, whereas at Benares, Allahabad and Lucknow, it increases from rupees 8 to rupees 14; thus at once shewing the advantages possessed by the lower parts of the country, and which appear to place the higher provinces, in a great measure, out of the field of competition at present, without reference to the enhanced cost of carriage, in itself a very serious tax on the article. This is more clearly displayed in the column, which shews the rate at which good wheat can be landed in Calcutta per maund. This, from the nearer districts would be, as appears by the statement, from rupee 1 to rupee 1-12, the average being rupee 1 : 5 : 6,* which, at the average of a year made out by Mr. Speede, in his memorandum submitted to your Committee, at rupees 1 : 13 : 4, the selling price in Calcutta, would yield, before shipment, to the grower, or mofussil dealer, a profit of thirty-seven per cent. It is unnecessary, in this place, to point out how much this profit would be enhanced to the party making purchases for shipment in the Mofussil, for it has already been dwelt on, at some length, in the minutes submitted to your Committee, which minutes, together with other useful papers bearing on this important question, the Society will doubtless transfer to its Committee of Papers for publication in its Journal. The returns from the higher provinces shew a range of from rupee 1 : 10 to rupees 2: 12 per maund as the price of landing good wheat in Calcutta, the average being rupees 2: 1 : 3, shewing an excess on the Calcutta rate before stated, *i. e.* rupee 1 : 13: 4, of 3 annas and 11 pie, or a loss of more than twelve per cent. Thus, without taking into consideration the fact of the residents of the higher provinces being themselves large wheat consumers, we can hardly expect perhaps for some time to come, that much wheat will be drawn from that portion of the Indian empire, for export to Great Britain.

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* Mr. Sarson's memorandum, founded on the purchase of upwards of 60,000 maunds of *doody* wheat at Monghyr, shews the average price, including all charges, to be 1 rupee 5 annas per maund.

*4th. Practicability of exporting Wheat in good condition.*—We now come to the last point of our question, the practicability of exporting wheat when produced. To say nothing of the extent to which the export of flour may be carried, in which form much has been exported, and much more, it is believed, would be sent to Great Britain, were sufficient encouragement afforded; experiment has shewn the fallacy of the assertion, that *wheat* cannot reach England from hence in good condition. It is true, we have a great enemy to our wheats in the weevil (calandra granaria;) but this insect is chiefly found in granaries, when the grain is in store, and where, under the present *mahajunnee* system of purchase, it remains for two or three years before it is presented to the market. These *golas*, or store-houses, it may be observed, are seldom cleaned after the abstraction of the old stock, and the new stock is frequently stored without a previous exposure of the grain, whereby the wheat is not sufficiently hardened to resist even the ordinary attacks of the insect. We have, however, proof, that wheat, *properly* *cured*, has lasted, under much exposure, for upwards of eighteen months; that it has been sent to England and returned to this country in good condition; and has obtained a remunerative price, and borne a fair comparison with British and other European produce. With this evidence before us, we cannot but express a decided opinion, that whenever the export has failed, the failure must have been either *in the selection, in taking old and infected wheat*, or in the curing, or in want of sufficient care and attention in the storing.* Hence, as is too often the case, the article has been blamed for the faults of those who speculate in it, without fully understanding the requisites for its export.

In conclusion, your Committee, with some confidence, place this short report, and its accompanying statement, in the hands of the Society. The result of your Committee's investigation has been to satisfy them, that this country is able to grow wheat that would find a ready sale in the home market, and that it can be produced and exported at such cost as would yield a very liberal return for the capital employed. They look upon the establishment of an export trade from India in corn as pregnant with advantages to this country, and therefore take the opportunity of reiterating the recommendation contained in their last report; viz. that the Society will be pleased to nominate a Committee for the purpose of preparing petitions to the two Houses of Parliament, praying the admission, into the ports of Great Britain, of wheats from this country, on the same terms as have already been conceded to wheat from Canada, and that copies of the petition be forwarded to the Board of Control and the Court of Directors.

(Signed) Jamas Hume, G. T. Fred. Speede,
C. R. Prinsep, Joseph Willis.
Wm. Storm,

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* See Mr. Wood's letter appended to this Report.

## *Extract of a Letter from* James A. Wood, Esq. *Superintendent of the Strand Mills, dated* 12*th February*, 1844.

With regard to the practicability of sending wheat from this to England, to arrive there in a good sound merchantable condition, I have not the slightest hesitation in saying, that it can be effected by proper attention being paid, in the first instance, to cleaning, packing, and shipping. I speak from practical experience. Before my arrival in this country from Sydney, I was in the habit of receiving large quantities of wheat from Calcutta, and grinding it: I have known it after a passage of 72 days, and being four months stowed in a godown, to be quite free from weevil or fly; and, on the contrary, I have known it to arrive at the same time nearly destroyed by weevil. The reason is clear. The grain that arrived in good condition was always quite clean on arrival in Sydney, and had evidently been well cleaned in Calcutta, before shipping; on the other hand, the grain that arrived in bad condition, was invariably of the foulest condition when received, though it was the same quality of wheat; viz. the *Doodea*, and could not have been cleaned before shipping from Calcutta.

The above, I should think, would be quite sufficient to guide the Society in forming an opinion, that wheat, with due care and attention in cleaning, packing, and shipping, can be shipped to England or any other country, to the greatest extent, in the best condition possible.

I intended submitting to the Society, a sample of wheat, that had been a voyage to England and back again; but unfortunately it has been mislaid by a party to whom I had sent it for inspection.

***To the Right Honorable the Lords Spiritual and Temporal of the United Kingdom of Great Britain and Ireland, in Parliament assembled.***

## The humble Petition of the Agricultural and Horticultural Society of India.

RESPECTFULLY SHEWETH,

That your Petitioners are members of a Society, which has for upwards of twenty years past existed in Calcutta, under the name of the "Agricultural and Horticultural Society of India," having for its object the promotion and improvement of Agriculture and Horticulture.

That the attention of your Petitioners has been lately directed to the cultivation of wheat in India. That with a view to obtain good practical information on the mode pursued in the culture of this article, on the ratio of production, on the cost of producing and profit derivable, and on the practicability of exporting it in good condition; your Petitioners addressed themselves during the past year to Agriculturists and other residents in various districts of Bengal, and the North-Western provinces, as also to parties engaged in the trade in Calcutta. That the result of such enquiries has been to satisfy your Petitioners, that this country is able to grow and export wheat that would find a ready sale in the home market at remunerating prices, were sufficient encouragement afforded. Your Petitioners conceive it unnecessary in this place to occupy the time of your Right Honorable House, with any lengthy remarks in regard to the culture, &c. of wheat in India; but they would respectfully beg reference, for such details, to the report of your Petitioners' Committee, which accompanies this petition, and whereon is based the opinion formed by your Petitioners of the certain advantage the opening of such a trade would afford, not only to Indian commerce, but also to that of Great Britain, in the necessary return of her manufactures.

While, however, your Petitioners are fully satisfied that the capabilities of India, as a wheat-growing country, are very great, and that any quantity of corn could be exported to meet the daily increasing demands of the mother-country, they would respectfully beg to draw the attention of your Right Honorable House to the serious drawback to such export, which now exists, in the duty levied on this necessary article of food.

Your Petitioners are aware of the passing, during the last year, of the Canada wheat and flour bill into a law, and the consequent advantages now possessed by that colony. Actuated therefore by a desire to further the objects of their Society, and to assist not only in ameliorating the condition of the agricultural, laboring, and all other classes of India, but in a no less degree that of the mother-country, your Petitioners respectfully pray, that your Right Honorable House will be pleased to take into its earliest consideration, the justice and expediency of allowing the admission, into the ports of Great Britain, of wheat from this country, on the same terms as have already been conceded to wheat from Canada.

And your Petitioners, &c.

[The Earl of Auckland, has been requested to present the Petition to the House of Lords, and that to the House of Commons, has been entrusted to Joseph Hume, Esq.]

## *Memorandum of the method of collecting Opium from the capsule of the Poppy, as practised in Assam.* By JOHN OWEN, *Esq.*

*To the Secretary of the Agri-Horticultural Society.*

DEAR SIR,—The subject of opium has for late years attracted much attention amongst the moralists and commercial classes in Great Britain; much has been said of the immorality of its use, its destructive effects on the people using it, and the necessity of a Christian Government interfering to prevent its extension, and to discourage such a cultivation. I am not going to enter upon a discussion of these points of the question, nor to argue the propriety or otherwise of prohibiting its production; or of opposing its use, whilst that of malt, and other articles, the pabula of distilled and intoxicating liquors, are encouraged; but it may not be uninteresting to those connected with the Society, to refer to the mode of collecting the juice of the opium plant in Assam.

I have no data on which to ground any statistical remarks as to the extent of culture existing in that country, or the proportion it bears to other articles of agricultural produce. Its growth is necessarily limited, because though no prohibition exists respecting it, it is, as far as possible, discountenanced by the local authorities in the province ; in some measure also by the continued impoverished circumstances of the people themselves, few having been, until very recently, able to afford this luxury of their ancestors, save in very moderate extent. On the part of the Government authorities, under the suggestions of Major Francis Jenkins, the Commissioner, whose exertions and good intentions towards the people under his rule are so well known, an undoubted preference in point of encouragement has been given to the article of tobacco, in the supposition, that this is less generally demoralizing in its effects, a point however upon which I do not offer an opinion; but it is generally acknowledged, that the natives in that quarter have arrived at the point of considering opium rather as a necessary, than a luxury of life; and I strongly suspect, much difficulty would be experienced in any endeavours at inducing them to leave off its use, more particularly when we take into consideration the increased amount of the circulating medium that has lately been introduced by the Assam Tea Company, and other speculators into that province. Formerly, labourers could not command more than from 1 rupee 8 annas to 2-8 per mensem; now they freely receive from 4 to 4-8. It is unnecessary to point out the vast amount that such a difference places at their disposal, for the cultivation of this or other articles of improved production; and such is the character of the people, that in nine cases out of ten, they would expend the whole amount of this difference in the culture of opium, and for this purpose deny themselves every other pleasure or luxury, nay, even the necessities of life. Nor is this feeling confined to the male population only, the women being equally disposed to indulge both in smoking, and otherwise using it.

The course of cultivation of the plant differs little from that pursued in other parts of India, and when the capsule of the poppy approaches maturity, irregular incisions are made on them with the *katari*, or one-bladed knife, in which respect a marked difference exists between the Assamese, the Behar, and other methods of obtaining the juice. A *scarifier* of six to eight double pointed blades used horizontally, being the usual mode there adopted for bleeding the capsule, whence the exuded juice is, after twelve hours, collected in a sort of small trowel, in which respect there is a marked difference in the Assam system, under which the exuded matter is collected on strips of cloth, which when perfectly saturated, are rolled into balls, and thus sent to market.

I am not aware whether the opium so collected has ever been submitted to a chemical test, so as to fix in any manner the difference of value between this and the Government opium. In the form I have described, it is called by the Assamese *káni*, and when new, and consequently less in demand, may be obtained from ten to twelve rupees a seer; though in a scarce period of the season, selling from forty-five to sixty-four rupees per seer. It is notorious, that the *Kyahs* or *Marwarrees*, who have for some years monopolized the external trade, make an handsome annual income by their opium speculation, extending their village advances after the plant has germinated, and then valuing the crop, which on coming to maturity, becomes the property of the so-called purchaser or mortgagee.

In use, it is considered that a piece of the cloth from five to six inches square, infused in water, is one dose, of which from five to six doses are daily taken by those who indulge in it, the cloth being afterwards used in chewing or introduction by the nostrils, and not unusually in their infatuation for the drug, placing it in the orifices of the lobes of their ears. In preparing it for inhalation, some *támul pât* or betel leaves are boiled, dried, and mixed with the opium, the composition being afterwards made into small balls and placed in the *chillum*, a few whiffs of which throw the inhaler in a short time into a state of delightful insensibility, of the pleasure whereof every opium smoker speaks with the highest gratification.

Taken to excess, this drug is no doubt debilitating, and injurious to a degree, whilst its moderate use can have little effect on the system compared with any immoderate indulgence of spiritous liquors; but this is for moralists, not for travellers to speculate on. Whilst the duty on consumption usually levied on it in Assam, in common with other articles of production, is of some value to the Government; legitimate, as affecting an object of luxury and indulgence, in common with all excise imposts.

If the foregoing be of any use to the Society, or others, it is at your service.

# Correspondence and Selections.

## COTTON CULTURE AT CEYLON.

*Extract of a letter from the Hon'ble* T. H. Maddock, Esq.

If the Cotton Committee of the Agricultural Society would favor me with an opinion of the quality and value of the accompanying specimens of Cotton from Ceylon, I shall be much obliged to you to request them to do so.

*Remarks by* Joseph Willis, Esq. *on the above Samples of Ceylon-grown Cotton.*

1. Sample of Cotton from Bourbon seed, the produce of "Masar" Estate, Jaffna, 1843.

*Staple,* of good length and strength, though rather irregular in its length, rather more curly than the generality of Bourbons, still a good staple, soft and silky.

*Color,* very good and healthy.

*Value,* from 5½*d.* to 6*d.* per ℔.

If it crops well, it ought to pay well, being in quality a decidedly satisfactory cotton.

2. Sample of Cotton from New Orleans seed, received from the Agricultural Society, Calcutta, the produce of "Masar" Estate, Jaffna, 1843.

*Staple,* of regular length, rather short, very curly, fine and weak.

*Color,* excellent.

*Value,* from 3*d.* to 3½*d.* per ℔.

The first view of this specimen is favorable, but a close re-examination proves, that it is deficient in stamina and strength; consequently it cannot be considered a satisfactory Cotton.

From a comparison of these two Cottons, the one being good and satisfactory, the other the contrary, it would appear that the soil and climate of Jaffna is well adapted for the culture of the Bourbon, while it is inimical to the growth of the American plant. The result of the examination of these samples will be found to be much the same as that of the Bourbon and Upland Georgia Cottons, grown at Jaffna, which were presented to the Society by Mr. C. K. Robison, at a general meeting held on the 14th December 1842.*

N. B.—The estimate of the values given to these samples are founded on the Liverpool market prices of the spring of 1843, which are about ¼*d.* per ℔ less than those of the spring of 1842.

### *Remarks by* JOSEPH WILLIS, ESQ. *on samples of Ceylon-grown Cotton, submitted to the Agricultural Society of India, by* C. K. ROBISON, ESQ. *at the General Meeting of the 14th December* 1842.

No. 1. Sample of Cotton grown from Upland Georgia seed at Jaffna, 1842.

*Staple*, rather short for Upland Cotton, fine, rather weak and curly, and a little irregular.

*Color*, tolerably good.

*Value*, barely 4*d.* per ℔.

No. 2. Sample of Cotton grown from Bourbon seed at Jaffna, 1842.

*Staple*, of good length, good strength and fineness, a little curly, and more irregular than the generality of Salem-grown Bourbons.

*Color*, good, a *slight* discoloration.

*Value*, about 5½*d.* to 6*d.* per ℔.

This may be considered a decidedly good cotton, the soil at Jaffna appears to be more congenial to the growth of the Bourbon than the Upland Georgia plant. If this Cotton crops well, its culture will repay. It is an encouraging production.

No. 3. Sample of Cotton grown from Tinnevelly seed at Jaffna, 1842.

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* The report on these samples was inadvertently omitted to be published in an early number of this volume : it is now inserted for the sake of reference.

*Staple,* short, curly and coarse.

*Color* and *condition,* pretty fair.

*Value,* 3½*d.* to 3¾*d.* per ℔.

No. 4. Sample of Cotton grown from Sea-Island seed at Colombo.

*Staple,* very strong, very long and silky.

*Color,* stained and somewhat imperfectly gathered, probably at an unfavorable time.

*Value,* 10*d.* to 12*d.* per ℔. Had the color been good, the value would be 2*d.* more, viz. from 12*d.* to 14*d.*

This at first sight is not a striking specimen, but a closer examination proves its goodness.

No. 5. Sample of Cotton grown about 20 miles from Jaffna, as an experiment, (seed not known.) It is about to be cultivated largely, was considered a prolific crop.

*Staple,* of good length, strength, and fineness, silky.

*Color,* very good.

*Value,* same as Bourbon, from 5½*d.* to 6*d.* per ℔.

This Cotton, in its general character, is not unlike Bourbon. As it is said to be prolific, it may be considered a very satisfactory Cotton, and in every way worthy of extended culture.

*Memo.*—The estimates of the values given to these samples are founded on the Liverpool market prices of the spring of 1842.

N. B.—All these samples are a little too curly.

## *Progress of the Branch Agri-Horticultural Society of Bhaugulpore. Communicated in the following letters from Major* T. E. A. NAPLETON, *Secretary of the Society.*

There is one more point of much importance to this Society which I must not omit to bring forward on the present occasion.

To render our Agricultural department more generally useful to the neighbouring districts, grain of all kinds must be grown, imported, and distributed. At present our crops are beautiful, of white gram, Darjeeling barley, New Orleans and Seychelles cotton, Bhilsa, Cuba and Havannah tobacco, Darjeeling and four other sorts of potatoes, Cabool coriander seed, and English and Cabool clover.

Thus far success has attended us in our first sowings, which is very encouraging ; and I can assure you, there is not a yard of ground in the Public Garden uncultivated. Hence, the demand for an extension of our garden. There are about 50 bigahs more of ground for sale adjoining the Public Garden, and if even half that quantity could be joined to it, there would be a large field for Agriculture in most of its useful branches.

Wheat from the southward of India, would be a boon ; Oats from England equally so ; and a few bags of English potatoes sent out, so as to reach us in September, would be most acceptable.

The potatoe seed distributed in this district since September last, has been of the greatest benefit. You will see by the memorandum on this head in the show paper.

I have the honor now, in the name of the Society, to return the sincere acknowledgments of this Institution for the kind expressions and wishes conveyed in your letter of the 16th Dec. : and further to proffer our grateful thanks for the vote of English fruit trees and tulip bulbs, (the latter arrived from Dr. Griffith this morning in excellent order,) passed by the Society.

*1st January,* 1844.

### *Bhauglepore Branch Agricultural, Horticultural and Floricultural Society.*

The second show of the present season took place at 3 o'clock P. M. this evening in the Public Garden, and was most numerously attended. Thirty tables were laid out under the tamarind trees, upon which were displayed various specimens of Floriculture and Horticulture ; the exhibition of vegetables could not be surpassed in any part of India for this season of the year.

The vegetable marrow, imperial peas, cauliflower, Windsor beans, endive, Caubul capsicums, beet root, early cabbage, potatoes (Cherra Poonjee and Darjeeling), artichokes, scarlet runners, and celery, were all to be seen in the greatest perfection. Some English and Caubul clover of the finest growth were exhibited.

In the Floricultural department there was not much competition, there being only two or three gardens at the station which contain many rare specimens of the beauties of Flora, and it has been decided in consequence, that fewer prizes for some months shall be given in this department, in order to encourage the residents of the place to improve and more extensively cultivate this branch of the science; and it is hoped, a taste for Floriculture will induce many to exert themselves to come forward and produce rare specimens in May next. Cuttings of all rare flower plants and shrubs will be ready for distribution in the Public Garden, together with exotics, on the 1st of February next.

Prizes to the amount of fifty Rupees were awarded in the vegetable and flower departments.

A basket of potatoes grown from Cherra Poonjee seed by G. F. Brown, Esq. elicited much attention. The size and healthy appearance could not be surpassed any where at this season of the year. We were happy to observe a great improvement in the *dalis* of the native gentlemen and cultivators. Potatoes, cauliflowers, carrots, and many other English vegetables were to be seen in great perfection.

Since our last Report, we have received the following handsome Donations, and cannot feel sufficiently thankful for the continued support this Society is constantly receiving:—

| | |
|---|---|
| From Major General Cartwright, .. .. .. | Rs. 30 |
| His Excellency Major General Sir G. Pollock, G. C. B. .. .. .. .. .. .. .. | 33 |
| W. S. Kelly, Esq. of the firm of Owen, Alhusen and Co. Calcutta, .. .. .. .. .. | 16 |
| Charles Edward Davies, Esq. of Lattypore, .. .. | 20 |
| Total Rs. | 99 |

We have also great pleasure in announcing the following additional Monthly Subscribers to our Branch Society:—

Lieutenant H. C. James, 32d Regiment N. I.

T. Grant, Esq. of Narrainpore.

H. Richards, Esq. of Nurdah.

Charles Edmond Davies, Esq. of Lattypore.

Captain A. Lewis, 32nd Regiment N. I.

This opportunity is taken to acknowledge, with very best thanks, the following Donations of plants, seeds, &c. from Non-Subscribers.

A boat load of flower plants, exotics and beautiful flowering shrubs, from Dr. Griffith, Superintendent Hon'ble Company's Botanical Garden. The plants were so well packed and secured, that only twelve out of three hundred and thirty died, notwithstanding they travelled some three hundred and sixty miles in a country boat. This speaks volumes for the attention paid at the Hon'ble Company's Garden.

Likewise from the same gentleman, a packet of Darjeeling barley, which is now well above ground, and in a most flourishing condition.

Likewise from the same gentleman, a packet of coffee seed, in fine order.

Likewise from the same gentleman, two packets of tulip bulbs, sent from the Parent Society.

Nothing could be fresher or more satisfactory than the state in which these bulbs arrived, and they were planted four hours after they reached this.

A packet of English clover seed, from Dwarkanauth Tagore, Esq. The plant from the above is now four feet high, and in blossom.

An assortment of very beautiful flowering shrubs and plants from G. W. Bartlett, Esq. of the Judicial and Revenue Department, Calcutta.

From the same gentleman, a large supply of rare and fresh seeds from his own garden.

Mr. G. W. Bartlett being a florist of great experience, has been enabled to give the Secretary of this Institution very great assistance and information from the commencement of our proceedings, all which is duly appreciated.

From Dr. Campbell, Superintendent, Darjeeling, the following useful and acceptable donations have come to hand:

A small bag of Darjeeling barley, the whole of which is well above ground, and in a most flourishing state.

A basket of Darjeeling potatoes of enormous size and excellent flavour; each potatoe was cut into ten or twelve pieces and planted, and has come up most freely.

From A. Lambe, Esq. of Arungabad, a fine batch of coffee seed in very fine order.

From Dr. Pearson, a lot of beautiful exotics and other plants, from the Right Hon'ble the Governor General's garden at Barrackpore, but owing to a very long voyage, (six weeks,) many died; those alive however are much prized, and must prove very ornamental.

Extra donation from Capt. E. P. Nisbet, Commander of the ship *Agincourt*.

A beautiful geranium, and also a myrtle plant brought from England in excellent order, for which the best thanks of the Society are accorded.

T. E. A. NAPLETON,

*December*, 1843. *Secretary*.

## MEMORANDUM.

By way of seeing how our crop of Furruckabad potatoes was progressing in the Public Garden, one root was dug up, and the produce was one hundred and three potatoes.

This is rather a late crop, and the potatoes were small; but in a month or six weeks, we may look forward to a magnificent crop.

Our Cabool melon plants are very healthy. I sowed the seed in trenches of sand with inches of mould above the sand. Very little water is required. If we rear fruit, we shall send some down to the Parent Society.

Our celery this year is magnificent; I never saw any thing finer in England. The seed which we sow in October, gives plants for the following year, and the rainy season does not hurt them. Plant out on the 16th of October. The seed of the fine celery was gathered from my own garden; and I have marked off several superb plants for seed this year.

## ASPARAGUS.

The crops in my own and the Public Garden are from seed of this year, and most luxuriant in growth.

There is one garden here famous for asparagus, and always carries off the prizes, and I will make interest with the owner to procure a supply of seed for you.

I have reared about 20,000 plants of Savoy cabbage, broccoli, Siberian kale, Brussels sprouts, late cauliflower, and other things *for late crops* from the seed sent by Vetch and Sons from Exeter. The Swedish and other turnips also have succeeded admirably. Also lettuce of sorts, beet root, &c. &c.; and we have ten plants of sea-kale well above ground. Can you give me a hint as to the management of this splendid vegetable?—[*See Speede's Indian Hand Book of Gardening, page* 163.]

I have reared 15 geraniums from overland seed. Polyanthus, many plants. Sweet William, plenty. Tulips, nasturtians and wall-flowers in profusion. Stocks in abundance. Our Flower Garden is beginning to look very well; and next month, when the weather is a little warmer, all backward plants will begin to show themselves. I hope I shall not tire you with this long Memorandum. But it is written with a good intention, and if it proves in the least degree useful, I shall be more than satisfied. I have reared several hundred plants of asparagus from seed received from Vetch and Sons. I have just received a barrel of seeds from them, and there are 8 ounces of asparagus seed. If sown now, it will be above ground in three weeks. I will dispatch 4 ounces by dak bh ngy to-day.* Sow on high ground, so that the rains will not injure the plant; plant out into beds 1st of October next. Soak the seed in cold water 24 hours before sowing. Water every five days or so afterwards.

21*st January*, 1844.

Bhauglepore, 22d February, 1844.

I have now the honor to acknowledge the receipt of your letter, dated the 17th January, 1844, and 2nd of February, 1844. In reply to the first, I have very great pleasure in reporting, that the two glazed cases of English fruit trees were delivered by Captain Templeton, of the Steamer *Berhampooter*, in *excellent order*. All the trees are alive and *thriving*, and we cannot sufficiently thank the Parent Society for these valuable acquisitions to our Public Garden.

In reply to your second communication, advising me of the intended dispatch, on the 12th instant, of a box of seeds, (contents fully enumerated and described,) by a Steamer, I am requested to state, that they will all be most acceptable to, and much prized by this Institution.

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* This supply has come to hand, and been sown in the Society's garden.

The *one seed* of Queen Ann's pocket melon duly came to hand, and you shall be duly apprized of the result of the experimental cultivation of it here. I am much obliged to you for the extract from Speede's India Hand Book of Gardening, touching the management of the sea-kale plant.

I have much pleasure in sending you an account of our last show, which we hope will meet the approval of the Parent Society.

### *Bhaugulpore Branch Agri-Horti. and Floricultural Society.*

The third show of the season took place in the Public Garden at 4 o'clock on the evening of the 3rd instant, and was most numerously attended by the European and Native supporters of this institution; the ladies of the station and several visitors honored the exhibition with their presence.

The display of vegetables was unusually good. The produce of the Public Garden surpassed in size and goodness every thing brought to the show rooms. Potatoes from Darjeeling seed, imperial and marrow-fat peas, celery, carrots, turnips, Windsor beans, capsicums, *cum multis aliis*, were first rate of their respective kinds. The Public Garden specimens, however, are not allowed to contend for prizes, and that circumstance will account for none being awarded to it in the accompanying list.

Two cauliflowers from Cleveland House Garden were allowed to be the finest ever seen in India. The color beautifully white, the heart very compact. One of these measured 3½ feet in circumference; when cooked, these were found to be perfect in flavour.

Some Darjeeling potatoes from the garden of C. Stuart, Esq. A basket of peas from the garden of G. F. Brown, Esq., Beet root from the gardens of Mr. Latour and Major Napleton. Some Battersea and sugar-loaf cabbage, and a basket of artichokes from Cleveland House Garden. Some nohl kohl from the garden of J. Glass, Esq. attracted much attention. It was gratifying to observe the great improvement in the *dalis* of the native subscribers. Instead of the poor specimens of indigenous vegetables they were accustomed for some time to bring, almost every *dali* contained good samples of English vegetables, and very superior indigenous ones. Altogether, the show was a most satisfactory one. Twenty-two large tables were quite crowded with Horticultural specimens.

In the Floricultural department, there was but little competition, though the show of flowers was very good. Violets, narcissus, heliotrope in great abundance, dahlias, roses of five sorts, dianthus, sweet briar, lupins, geraniums, euphorbias, *cum multis aliis*, were to be seen amongst the bouquets.

In the Public Garden are to be seen some very promising plants of carnation, primrose, polyanthus, sweet william, ice plants, and a great number of double stocks in full blossom, as well as violets, and many other things.

This opportunity is taken for according the best thanks of the Society for the following most acceptable donations :—

From the Parent Society.

Two cases of English fruit trees, containing 1 black Hambro and 1 Frontignac vine, 1 Calhac pear, 1 brown buorrie pear, 1 ribstone pippin apple, 1 of king Pipin's apple, two white currants, 1 roaring-lion gooseberry, 1 black currant, 1 incomparable peach, 1 red Roman nectarine, 2 mayduke cherries, 1 green gage plumb, 1 Orleans plumb, 1 apricot (Moorpack,) and 1 fig tree. The above named fruit trees arrived in the finest order, and are all in a most flourishing state, a clear proof that much attention has been bestowed on them since their arrival in India.

From Dr. Griffith, Superintendent, Hon'ble Company's Botanical Gardens.

A large assortment of seeds of most esteemed kinds.

From the same gentleman by dak banghy, a small hamper of cuttings of rare and most acceptable plants packed in mould and moss, &c. This novel and most successful mode of sending cuttings, is deserving of the best attention of all lovers of Horticulture and Floriculture.

From Walter Landale, Esq.—Some Assam tea seed.

From J. F. Caston, Esq. of Monghyr.—Two Caubul vines.

From Captain Don, several Constantia vines.

From H. C. James, Esq. 32nd Regt. N. I.,—Six vines of the white grape in very fine order.

From Captain Lewis, 32nd Regt. N. I.—A few Darjeeling potatoes, some acorns, chesnuts, and raspberry seed.

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From G. W. Bartlett, Esq. of the Judicial and Revenue Department, Calcutta.—An assortment of plants, such as the ivy-leafed, Leicester and horse-shoe geranium, poinsettia pulcherrima, verbena triphylla, euphorbia jacquiniflora, passiflora kermisina. All these arrived in most excellent order, and we are much indebted to Mr. Bartlett for his continued favours and contributions.

From Lieut. Colonel Lloyd, C. B.—Several apples of the Darjeeling potatoe, the seed of which will be sown in due season experimentally.

From C. Stuart, Esq.—A large supply of West India arrow root bulbs, or tuberous roots, also a cane of a beautiful cedar tree procured by him whilst in England. The cane answers to plate 13,537 at p. 806 of Loudon, where it is called cedrus, or cedar of Lebanon.

From Dr. Griffith, Superintendent, Hon'ble Company's Botanical Garden.—A packet of very fresh fruit and vegetable seeds, all from Portugal; likewise the seed of the cork tree. The whole of these are most valuable acquisitions. For the continued and solid assistance of Dr. Griffith in supplying, (and on several occasions anticipating) our wants, we beg to offer our sincere acknowledgments.

It affords the Society much pleasure to publish the names of the following additional subscribers since our last report:—

T. V. Seddon, Esq. of Moorshedabad.

Raja Oodit Narrain Sing of Kurowah, Alumnugger.

C. Stuart, Esq. of Kunjurpoor.

It is the intention of this Society to have an exhibition of Agricultural produce in April. Immediately after, two silver medals received from the Parent Society for 1843, will be awarded.

One for the best samples, (not less than five seers of each kind,) of grain.

The other for the best specimens of cotton, tobacco, potatoes, &c.

The Zumeendars, Ryots, or Kachees to be in possession of a certificate, that the samples brought to the show rooms are *bonâ fide* the produce of their estates.

T. E. A. Napleton, *Secretary.*

*February*, 1844.

## PROGRESS OF VARIOUS CULTURES IN THE LUCKNOW HORTICULTURAL GARDEN.

### *Extract of a letter from Captain.* G. E. Hollings.

Yours of the 12th January reached me two or three days ago. I shall feel much obliged for the maize seed. I have a fine specimen just coming into fruit; I received the seed from you. Although I cannot yet compete successfully against all the gardens in the city and cantonments in every thing, I have grown some excellent specimens of vegetables from the seeds you sent me; and many flower seeds which I got from England have germinated, and one of the tulip bulbs you sent me has sprouted; two more are still alive, but have not yet struck. Hitherto the season has been particularly favorable; there is promise of an abundance of fruit from the loquat trees, and it seems from the number and strength of the blossoms, that the mangoe season will be particularly favorable. The vines are now being cut, and the roots covered over and manured. I have not forgotten your commissions regarding the cuttings, which shall be sent to you as well prepared as I can effect. The vines from the seeds given to me by Sir William Nott, G. C. B., are still alive, and are coming into leaf. There is a very fine crop of tobacco, from seed kindly sent by you, and our arrow root promises very well. I hope to be able to succeed better in the packing this year than I did last. I will send a packet of tubers as well as of the prepared powder. The cotton from acclimated seed has thriven very well, but I cannot get persons to make thread properly. I will, however, forward some of the raw cotton, as well as some thread to you.

I have English cucumbers and melons progressing towards ripeness, which is unusual at this season of the year. The cauliflowers have been particularly fine this year, and there is a young crop of them, and of peas, cabbages, beet-root, celery, and lettuce, from seeds sent to me direct from England, which were planted just before the late golden showers of rain fell, and which are getting on famously. My experiments regarding the pine-apple have succeeded much better than I anticipated, and I have some very promising plants.

I shall feel much obliged for any specimens of fruit trees, (English,) which you can afford to send me, and I should much like to get supplies of sugar cane, pine-apple crowns, leechee trees, and the finer description of plantains.

In furtherance of the objects, the accomplishment of which is contemplated by the Society, I shall be happy to give any of the members who may require them, acclimatised seeds of every fruit, flower, and vegetable which I may succeed in rearing; and if you think proper, you may advertise, that any application made to me will be attended to; the seeds will be furnished *gratis*, but the parties receiving them, will have to pay the expenses of transit.

My strawberries and apple trees are not so forward as the cantonment ones, which may probably have been caused by some delay in transplanting, and a comparatively poorness of soil; the plants and trees are however very healthy, and I expect that next year I shall be able to spare some thousands of the former to friends at Cawnpore, Seetapore, and Secrora. I have in my own garden, the only two dahlia plants at Lucknow; one has produced a very handsomely colored flower, (deep red,) but of inferior size; the other is sickly, and I have cut it down. I hope to be more successful with the roots next year. I intend to indent on my friends for a supply of bulbs, and shall feel obliged by your sending me any varieties, especially of double ones, procurable in Calcutta.

I have lately received some hints regarding the cultivation of vegetables and flowers from the Rev. Mr. Carshore, the Clergyman at Cawnpore, of which I shall avail myself practically, whenever opportunity offers.

I do not see any mention made of the narcissus amongst the flowers exhibited. I could send you a supply of bulbs, if you would like to have some.

I see by the Journal, that my friend Lieut. Brooke of the 63d, has been more fortunate than I was in finding the real Orchis mascula, which produces the salep of commerce; but I am convinced, that it grows in the vicinity of the Oude Teraee, and I will, if possible, send you specimens.

It appears to me, that the climate of Oude would be very favourable to the silk worm, as the mulberry thrives very well, as regards its foliage; I should be glad to get a supply of eggs if they can be procured in Calcutta, and to send the silk to the Society for examination.*

## RESULT OF TRIALS ON CEREAL GRAINS, HEMP, FLAX AND VEGETABLE SEEDS.

*Extract of a letter from* T. J. FINNIE, ESQ. *dated Agra, 30th December*, 1843.

While upon this subject, I may as well inform you of the result of the wheat, barley, and oat seed you sent me. I am sorry to say, that notwithstanding the great care which was taken in planting them, not a seed has come up, except the Hopetown oat, the Common oat, and the naked oat; all of which came up well. Of the grain which you sent in the heads or spears I did not expect much, as it was the worst I ever saw any where. The packet of wheat which came in the box which was so long on the road, and another which I received last year too late for planting, I suppose had been bladed by the effects of the climate. The English and Russian hemp seed both failed to germinate. The English flax seed came up, but a good deal of it died, and left the remainder so scattered, that a great many branches put out from the root, which ought not to be the case with good flax; it only reached the height of about a foot, which of course rendered it worthless. I have found the Cape and American vegetable seed uniformly good when planted by Capt. Munro, Secretary to the Agricultural Society, or myself, but they have as uniformly failed when the planting was left to the native *mallies*, who either sow the seed in ground which is too wet, or sow in perfectly dry ground, and then flood it with water; in either of which case, they never come up. Great care is here necessary in the preparation of the ground for the reception of seed. Water it thoroughly, and let it lay two or three days until it crumbles, when dig up; when in this condition, turn it up thoroughly with the spade, and smooth it with a rake, then plant the seed and wait until they appear above the ground before watering them; or if watered at all, let it be with a rose watering pot, and if the sun is very powerful and the plants delicate, shade the bed during the heat of the day, and I think you will find the seed better than they are generally supposed to be.

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* Steps have been taken to meet this request.

## *Extract from a Memoir on the Medical Topography of Tirhoot. By* K. MACKINNON, M. D., *Civil Assistant Surgeon.*

Situation, Boundary, &c.

I. The district of Tirhoot, in the province of Behar, is situated on the North side of the Ganges, bounded by that River on the South; on the West by the great Gunduck River; on the East by the district of Purneah; and on the North by the great Saul forest of Nepaul, commonly called the Terai. It lies in the 26th and 27th degrees of North Latitude, and in Longitude 84° to 86° East. Beyond the Terai lie the Nepaul Mountains which are visible in clear weather from almost every part of the district, and occasionally the snow capped summits of the Himalayah ranges may even be seen. The prevailing winds are from the East and Westward. The former blows pretty regularly from the beginning of April to the setting in of the cold weather, during which season, there is much irregularity, as to the winds which may prevail. When cloudy, and threatening rain, the wind is usually Easterly; should a heavy storm come on, it veers round to the North, and the weather generally clears up by the setting in of a fresh breeze from the Westward; as the cold season advances to the end of January and to February, this wind continues to blow strongly for days, and even for weeks together, accompanied by a cold, bracing atmosphere, than which nothing can be more delightful. In March, though the sun gets powerful, the weather is very pleasant, and the wind is still Westerly. In April, East winds blowing fresh during the day and night are most common, but not unfrequently from twelve at noon till evening the wind blows strong from the Westward.

In May, East winds prevail still more, and even when Westerly they have not the dry parching character of hot winds up the country.

During the six years I have been in Tirhoot, I have not known a week's continuance of what could be called a hot wind.

Lakes, Rivers, Tanks, Wells, &c.

II. Tirhoot abounds with Lakes, Rivers and Jheels. The principal Rivers are the Great Gunduck, the Byah, Little Gunduck, the Bhaugmutty, the Luckun-Dye, the Buckiah, and the Kumlah; the sources of which, and the courses they run, will be seen in a rude map which will be appended to this memoir. The yearly inundation of the country by these rivers is a chief point of interest. During the months of July and August the rains fall heavily, (appended is a Register of the number of inches, during the months of July, August and September for 7 years.) These rains are followed, as a matter of course, by the rising of the rivers, which, from about the middle to the end of July, are wont to overflow their banks, covering the face of the country with their superabundant waters. What I call lakes, are sheets of water which are situated generally near rivers, and appear to be old beds of the streams from which each is now annually replenished with water. They generally bend in a horse-shoe shape, and are very narrow in proportion to their length. The origin of these sheets of water is an interesting subject of inquiry to the physical Geographer, but to the Medical topographer they possess that painful interest, which arises from a knowledge of their being a prolific source of disease. When the rivers with which they are connected, fall below a certain level, the water ceases to drain from them. Stagnation ensures, vegetation progresses along their edges, and as heat and drought increase, the aquatic plants with which they abound decay, producing malaria.

Jheels or rice chowers are very abundant in Tirhoot. These seem to be natural basins for the reception of the superabundant waters which would otherwise swamp the whole country. The district may be said to consist alternately of ridges of comparatively high land, and of the chowers in question, the slope being in most places very gradual. Many of these Jheels are however not dependent solely upon the rain water for their supply, for they have in many instances a communication with the neighbouring rivers, which fill them as they rise. The annual drying up of this water is effected altogether by evaporation, and it will be readily believed that these Jheels are fruitful sources of disease and death, and they lie on so low a level, that even if the rice crop did not depend on their supply of water, drainage would be impossible. The Wells in Tirhoot are very numerous, and in general good, but in not a few instances the water is impregnated with saline ingredients, rendering it slightly brackish. There are numerous Tanks also, and in the

Northern and Eastern parts of the districts, some of these are of enormous extent, and it is thought of great antiquity.

The climate.—Its Physical character, and Medical effects; with the highest, lowest, and medium state of the Thermometer.

III. The climate of Tirhoot is reported to be of great salubrity, and for Europeans it undoubtedly is so, which I attribute to the following circumstances. As will be seen by the annexed Thermometrical Table, the ranges of temperature are not great, comparatively speaking. We are exempt from the extreme and sultry moisture of Bengal, and the parching dry heat of the Upper Provinces. Whilst, as already mentioned, the range of the Thermometer is moderate.

I have no data to prove the assertion, but I believe that comparison will shew, that the range here, in twelve months, would be lower by some degrees than at Patna. The face of the country continues covered with vegetation during the hot months—Is this the cause or the effect of the temperate climate, I stop not to inquire. The vicinity of the hills must too have some effect upon the temperature.

In judging of Tirhoot as a climate for Europeans, it must be borne in mind, that all the Europeans who live in it are of the higher ranks of society, and in the possession of comforts, and in the enjoyment of at least full means of subsistence; and these things, it is not to be disputed, contribute to health as a general rule, and more especially do they act as safeguards against some of the diseases to which the human constitution is prone in Tirhoot, such as Fevers, Cholera and Dysentery. It is also to be mentioned, that the Indigo Planters, who are the chief residents in Tirhoot, are men who take violent and constant exercise; living also in good houses; and to this former cause, as much as to the temperate climate, do I attribute the robust health they enjoy. It is indeed so robust as to be remarkable. These gentlemen look more like English farmers than tropical residents, a fact that is worth the public notice, for it is my belief that a sedentary life is a chief source of disease in India[*].

For Natives, the climate of Tirhoot is I think very unhealthy, and the chief source of disease is malaria, acting of course more or less virulently according to different remote causes, such as diet, peculiar locality, comforts of residence, as to cleanliness, airiness or otherwise, and producing according to the modified operation of such causes, fever, dysentery, cholera, &c. Here is a subject with which I might fill pages, and yet leave much unsaid, and my own anxiety to do good unsatisfied.

The poor natives exercise the worst possible judgment in the site of their villages, and in their houses they have from the lowest even to those who might afford it, no comfort, and a sad want of cleanliness. They moreover, during the worst seasons of the year, almost live upon half ripe fruits and vegetables. These, alas, are things which it will take time to remedy, but there is one great source of disease very easily got rid of about every village; there are numberless deep holes, which in the rains fill with water, this of course becomes stagnant, and gets mixed with all sorts of impurities. These puddles are formed by the digging out of mud for making walls to their Houses, but a few local Police Regulations might convert them into useful drains for carrying off all manner of impurities, and thus add greatly to the public health.

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[*] I speak of course with reference to the European resident.

The soil,—its nature, elevation, &c. Nature of the waters, evaporation, malaria, &c.

IV. The soil of Tirhoot varies much in character in different parts of the district. In the more Southern and Eastern parts, it is sandy and alluvial, frequently mixed with Carbonate of Soda. In the Northern Pergunnahs there is more clay, and a mixture of Iron-salts is not uncommon; Saltpetre also is abundantly found. To the Westward again the soil is *rich* in alluvial quality, with little saline mixture. The face of the country has a rich and picturesque appearance, being beautifully wooded, especially on the banks of the lakes, where the scenery is absolutely fine.

Vegetable, Animal and Mineral products.

V. On this head I do not consider it necessary to say much; having little or nothing new to offer. The breeds of the different domestic animals do not differ in any material respect from those of the neighbouring provinces. Amongst the numerous herds of bullocks used by the Indigo Planters in Tirhoot, some are to be seen of great size and power: cattle die in great numbers in the cold and wet weather, and in the hot months, they are subject to a disease which the natives call by the name for small-pox, and which I believe to be identical with the same disease in the human subject.

Sheep are numerous and good, but their wool is fit only for the manufacture of coarse blankets; small native horses are numerous in comparison to what they are in Bengal and some other provinces, and some of them are capable of enduring long exertion

Wild water fowl are in great variety, and so numerous that 1,400 may be seen at a time in some of the many Tealeries kept by Europeans.

The native Catholics in Bethali rear numbers of Turkies for the Tirhoot market; but neither these birds nor guinea fowls can be plentifully reared in Tirhoot. In short, it may be said of all the domestic animals, that in the breeding and rearing of them, there is much room for improvement. Game is pretty plentiful in Tirhoot, the objects of the chase being the same as we find in other parts of the country The

Nepaul forest abounds in the various animals found in the jungles of India. That able naturalist, Mr. Hodgson, has fully described the denizens of those wild and solitary regions. Wolves are said to be increasing; several of the smaller species of the feline tribe are rather destructive about farm yards; one closely resembling the Lynx was lately killed near Burrah factory, and another animal said to be hitherto unknown (probably from its retired habits) namely the Paugolin of Buffon, corresponding exactly with his description. The Porcupine is common in some parts of the district; and on the jheels to the South-East, the Otter has been killed by sportsmen, and also taken alive and tamed. Fish is plentiful and of many varieties; alligators of enormous size, as well as the Gurreeal or crocodile, abound in the lakes and rivers.

Of mineral productions, strictly so called, Tirhoot affords none. But the soil, as already mentioned, is abundantly impregnated with neutral salts. The carbonate of soda used by the Native Washermen, lies in many places so thick on the surface of the soil as utterly to prevent vegetation; saltpetre too is very abundant.

The state of Agriculture.

VI. Agriculture is carried on in Tirhoot to as great and varied extent as in any District in India; but still the favourable soil and climate afford much room for improvement; as even those amongst the natives who might command the means of improvement, are supinely content with the indifferent and degenerating sorts of some of their most useful esculents; and British example and patronage in respect of the introduction and grafting of new fruits and vegetables, and of new methods of cultivation, have not hitherto been much displayed, excepting by some of the Indigo Planters, to whom in fact Tirhoot is indebted in every point of view for much of its present prosperity, and for all that it has advanced towards the arts and civilization of the West. Rice is cultivated partially all over Tirhoot, but largely to the North-East, where the extent of low or chower land is comparatively so great. On the higher lands are to be seen Wheat, Oats, Barley, Maize, Millet, Flax, Sugar-Cane, Hemp, Cotton, Castor Oil plant, and Putwâ (used as Hemp for Ropes), besides many sorts of Pulse or Dhal, and of the smaller plants of the natural order Gramina, the three species of mustard seed so valuable to the Natives. Also fields of edible and medicinal roots, the Yam, Sweet Potatoe, Soontee, Ginger, great Arum, Turmeric, the Gemaiah Uddruck, the Ec-unglee, the Diahda, the Kurree Huldee, four of the same genus as the Ginger and Turmeric, and the last named a very singular looking root, being when cut through of a bright blue tint as if steeped in Indigo.

Aromatic seeds are grown chiefly to the North-West. These and Coriander, Amide Seed, Agwain, Zeera or Fennel Seed, and the long red Chili Pepper is extensively cultivated, the Pawn Leaf is abundant and cheap.

For native crops, the mode of tillage is generally rough and imperfect, though the cultivators are most industrious. Want of capital checks good farming here as elsewhere. The land taken for the indigo planting, is brought in Tirhoot to the finest possible state of culture, and in the vicinity of the numerously scattered factories, amounting in Tirhoot and Sarun to upwards of 60 (including branch factories or outworks) carrots and turnips and sugar-cane are cultivated to feed the factory Bullocks, also Mangul-Wurzel; besides well tilled and beautifully extensive fields of Oats for the numerous Horses required by the Planters, and near Poonah for the Company's stud. The Potatoe in one or two instances, where the soil is light, has been obtained of really good quality. Experiments have been tried of planting this favorite root on high beds, with trenches between, this plan has produced good Potatoes, but in one instance those reared on a level and irrigated field, surpassed in mealiness any ever seen in India; but whether this superiority was from the soil chiefly, or from the mode of culture, is from paucity of experimental agriculturists, still doubtful. Much might be done by combination of enterprise.

Of Fruits, Tirhoot yields a variety, and might yield a much greater. Digah Farm has been an useful circulating nursery for objects of Horticulture, and the gardens of many Europeans, and a very few Natives in Tirhoot, afford good fruits, such as the Bombay and Malda Mangoe, the large green, and the small black Constantia grape. In a few instances, some fine specimens of several sorts of English Apple and Green gage, the latter requiring however to be laid in Cotton to ripen, the Lechee, Loquat, Citron, Shaddock, Lemon, Lime, Guava, Plantain, Custard Apple, Corinda, Wampee, Brazil Currant, and Love Apple, Melons of various sorts, but not high flavored, the Pine-apple seldom very good, the Strawberry rather fine, and with care abundant; the Cocoa-nut tree is seen, but in very few gardens in Tirhoot. At Mozufferpore however there is one garden belonging to a Native Zemindar, which does credit to his son's taste: for it contains Cocoa-trees, and amongst other foreign plants the Cinnamon and Betel from Bengal. Besides the above mentioned fruits, the Bazars of Tirhoot are supplied with the Jack, the Baila, the Tamarind, the Oola or Sowfi-nut. The water Melon, which with its seeds affords both drink and a light food from the kernels, is sown in small pits in the beginning of the hot season, in the sandy soil of dried up river beds; and on the village roofs, the Pumpkin, Cucumber and Gourd are to be seen. It would be tedious to enumerate the various sorts of vegetables, both leaf and pulse, or bean, used by the natives. Their resources in this poor diet are many, and yet this year, from want of capital, and a partial failure in the rice crop, there have been many deaths from starvation; the poor Ryots plucking the scarce formed ears of the Rhubbee crops, and cooking them. And at Mr. Y.'s factory several hundreds of women and children receive a daily dolee of rice, thus shewing, that from interest as well as inclination, it is the planters' duty to protect the peasantry. The Poppy rears itself in gay luxuriance around the villages, the Bang, an intoxicating weed, is often sown, the Date and Tartree yield the useful and also pernicious toddy, but the fruit of the Date tree in Tirhoot is very indifferent. European flowers thrive in this climate, also some of the Nepaulese and Persian shrubs, and the Mulberry grows with great vigour. Tobacco is raised in great quantity, and the varieties of this plant sent to Tirhoot from the Agricultural Society thrive beautifully.

As connected with, though not belonging to, the subject of Agriculture, a few words on the manufactures of Tirhoot may be of some use, even though differing little from those of other districts. Cotton cloths are woven in Tirhoot for home consumption; but English Calico, both white and printed, are used also by the natives, the country cloths being almost all of very coarse texture and more expensive, though less perishable than the British. They are more costly than the American fabrics which are now used at some of the Indigo factories. Combs of wood and Buffaloe horns are coarsely made. Hemp is manufactured here into coarse sacking, and this when old is converted into paper.

From the fibres of the stalks of the Putwa, a plant of the same class as the Cotton, ropes are manufactured as well as from hemp; while the flax is cultivated for the produce of the linseed oil alone; no attempt having been made to prepare its fibres for the manufacture of linen. From the several sorts of shells of the rivers, both univalve and bivalve, lime is constantly prepared. Potter's clay seems good and abundant in Tirhoot, though the common vessels manufactured here are not so strong, and do not resist fire nearly so well, in the opinion of the natives, as those which they occasionally import in very small numbers from Bengal; and no attempts are made in Tirhoot at any finer earthenware, than the shining black sort covered with a kind of Oil varnish. Carpenters and blacksmiths are employed in great numbers at the Indigo factories, and some of them excel in their respective trades to a degree that gives reason to think, that by more encouragement, their ingenuity might prove very great.

The manufacture of woollen fabrics is restricted by the bad quality of the wool. Some few specimens of the English sheep are now in the district, but it is not likely that they will improve the quality of the wool, to which object the climate seems an insuperable obstacle.

Roads and Communications.

VII. The annexed sketch map will shew the line of the different roads. Those marked "Government" were originally formed by Government, but are now in many parts repaired by the Indigo Planters; and the lines of road marked "P" are made entirely at the expense of the Planters; and being under their immediate and daily inspection, are most of them pretty good, and some of them (those near Barrah factory especially) are wide and finely raised and sloped to each side gradually, having in the principal thoroughfares, on both sides of the raised road, a low road for the bullock carts to pass along during the dry season, when the high road would otherwise be much injured, the Westerly winds blowing away the soil loosened by the constant track of the heavy wheels. The mark "B." indicates the places where bridges are chiefly needed. The Indigo Planters find that a comparatively small annual outlay on their roads and bunds, is an ultimate saving; and these roads are of course of incalculable advantage to the native traffic. The North-Eastern parts of Tirhoot are, for want of raised roads, quite inaccessible during the rains for wheeled vehicles; and sometimes even for foot and horse travellers. So much so, that in the event of any hostile invasions from the Nepaulese, half of Tirhoot might be laid waste, ere troops could march to its protection. The great Gunduck, Little Gunduck and Bhagmutty are partially navigable throughout the year. The other rivers are not so.—*From the India Journal of Medical and Physical Science, for January,* 1844.

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## *A Commentary on certain passages in the Physiological Writings of the late* THOMAS ANDREW KNIGHT. *By* W. WOOD.

ON THE ADVANTAGE OF EMPLOYING VEGETABLE MATTER AS MANURE IN A FRESH STATE.—Opinion, founded upon experiments, "that many vegetable substances are best calculated to reassume an organic living state, when they are least changed and decomposed by putrefaction."

First experiment, upon a seedling Plum—*The seed* placed in a small garden-pot, and nearly filled with living leaves and roots of grasses, mixed with a small portion of mould, placed under glass, without other artificial heat, appeared in April—was *removed* into a larger pot *three times* during the summer, each time with same kind of material for potting; end of October occupied about one-third of a square foot, at which period its height was 9 feet 7 inches. Further experiments in manuring Turnips with green fermented Fern and black vegetable mould, and branches of trees in every stage of decomposition—the latter applied four-fold more than the former—the result being greatly in favour of the former; the growth, &c. being much more rapid than the effects from either vegetable mould or stable produce, and distinguishable in the autumn from the rest of the field, by the deeper shade of their foliage. The above experiments conceived to be satisfactory, in showing that any given (I presume *proportionate*) quantity of vegetable matter can generally be employed in its recent and organised state with much more advantage than when it has been decomposed, and no inconsiderable part of its component parts has been dissipated and lost during the progress of putrefaction and fermentation.—*Hort. Trans.*, vol. xvii.

*Remarks.*—This interesting fact, though valuable in its results when applied to the cultivation of plants remarkably robust in constitution, or known to be gross feeders, and under the most favourable circumstances, does not appear equally applicable to the general cultivation of exotic plants in pots. Had the experiments been applied to the management of ornamental plants, even in the attainment of a medium growth, I have no doubt that the results would have been less favourable, for the following reason:—*The higher we rise in the scale of cultivation, the more powerful are the agencies required to effect our purpose.* And in the cultivation of plants intended for superior growth, there are many instances of extreme fluctuations of temperature, to which the amount of counteractive agency is unequal; and hence I infer, from abundant evidence, that the mechanical texture and effect of undecomposed vegetable matter would by no means balance the injurious influence of its absorbent properties. The undefinable variations of vegetable structure and capability of assimilating matter as food, under equal variations of atmospheric and solar agency, would preclude the application of undecomposed vegetable matter in many elaborate processes of cultivation. The accumulative system of culture is negatived in the above facts.

On the most Advantageous Form of Garden-pots.—"I have constantly found the growth of trees to be most rapid when the roots and leaves are brought nearest to each other, under similar external circumstances; and the horizontal space necessarily occupied by the leaves and stems of plants will in almost all cases exceed the width of the pots, of the form now recommended; the width of each being as 8, its depth will be as 6, and its smallest width at its base as 5, inside measure."—*Hort. Trans.*, vol. iii., p. 378.

*Remarks.*—At p. 110 of "Paxton's Magazine of Botany," an opinion is offered that "the capability of roots to fulfil their natural functions will be in proportion as modes of cultivation approach Nature so nearly, as to permit their free *extension* and *ramification* in search of elementary substances, &c.: and that it will probably be found that the amount of food thus obtained will be commensurate with the *dispersion* of the roots over a given surface;" which opinion appears strictly to coincide with Mr. K.'s view.

ON THE APPLICATION OF MANURE, IN A LIQUID FORM, TO PLANTS IN POTS.—"A large extent and depth of soil seem, therefore, to be no further requisite to trees than to afford them a regular supply of water, and a sufficient quantity of organizable matter; and the *rapid growth* of plants of every kind when their roots are confined in a pot to a SMALL quantity of mould, till that becomes exhausted, proves the truth (sufficiently) of this position."—*Hort. Trans.*, vol. ii.

*Remarks.*—It would appear from the "rapid growth" here spoken of, that Mr. K. believed plants capable of the most rapid growth when confined in small pots and removed to larger, according to the ordinary and restrictive system; but this opinion can be only maintained by showing that a small plant removed in its young and excitable state to a *larger* quantity of soil, of a *texture* and *quality adapted* to its growth, and so mechanically arranged as to enable its tender organs progressively to assimilate its food without being liable to an *impeded* circulation of moisture,* is, in reality, making a slower progress to maturity than a small plant, "confined to a small quantity of mould." But the real difference I presume would be, that the former, by a judicious *adaptation* of its organs to the increased amount of agency brought to act upon it, would be attaining an *accumulative* vigour by a uniform development of its axillary buds, and consequent deposition of a uniform amount of organizable matter, whilst the latter, if allowed to surpass the other by a more rapid growth, could only do so by an attenuated growth, which is invariably connected with abortive or undeveloped leaf-buds. In the former, accumulation is not only *progress*, but *maturation;* in the latter, rapid growth is abortion, and loss of functional power, by the repeated intervention of secondary causes, each of which interferes with an ultimate effect. This paper fails to recognise any principle which involves the application of higher agencies in Nature, or any modification of organic matter, to be rendered *successively* applicable to the different stages of growth.

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* Paxton, p. 110.

ON THE CULTIVATION OF THE PINE-APPLE.—"The temperature of the house raised by means of *solar heat* from 95° to 105°, sometimes to 110°, no air being given till the temperature exceeded 95°. The compost of *thin green* turf *chopped* very small, and pressed *very closely* whilst wet; a circular piece of the same material being inserted to occupy the bottom of each pot; having found this substance most efficacious for draining, &c., and subsequently of facilitating the removal of a plant from one pot to another *without loss of roots.* The pots *elevated* upon brick piers near the glass."—*Horticultural Transactions,* vol. iv.

*Remarks.*—This paper bespeaks an advance in the principles of cultivation, and tends to illustrate the first principles of Horticulture. There is the application of higher agencies, which, in some measure, may be regarded as a new power, subservient to the highest possible effects in cultivation; and, in the "chopped green turf, is given a texture and mechanical arrangement, adapted to the power of the agency applied, and the attainment of a uniform circulation of moisture." This paper may also be considered a full illustration of the following opinion given at p. 112 of Paxton's Magazine, viz. :—"Atmospheric and solar influence should be so modified as to balance the power of absorption to which plants are exposed, &c." There are also valuable inferences to be drawn from the use of *chopped turf,* as a "substratum" or drainage; perhaps a perfect system of cultivation will include the complete subserviency of the *mechanical* to the *assimilative* process in the economy of vegetation. The *safe* "removal of plants from one pot to another, without loss of roots," appears to be a dim recognition of that "Principle of Horticulture" by which an accumulative system of cultivation must either stand or fall, viz., that "for the maintenance of a plant in health, it is indispensable that the supply of fluid by the roots should be continued and uninterrupted" (Principles, 32). Here it may be observed, that until it can be proved that the removal of plants from one pot to another does, in *no wise,* affect them injuriously under the *same circumstances,* the principle now quoted must for ever decide the question of expediency. The removal of plants without loss of roots is certainly desirable; but the question again recurs—Can they be removed at all without sustaining a loss of that *functional power,* by the continued uniform reciprocal action of which the "supply of fluid by the roots" can alone "be continuous and uninterrupted?" Every hour's experience denies the possibility of this.

On the Cultivation of the Cockscomb.—"Treatment similar to the Pine-Apple, having a similar object in view. A single flower-stalk of great strength is requisite, the protrusion of which should be retarded as long as possible, consistently with the rapid growth of the plants. Compost, nutritive as possible, and stimulatory; of unfermented horse-dung, *fresh*, burnt turf, decayed leaves. Two parts green turf, the latter being in *lumps* of about *an inch* in diameter, to keep the mass so hollow for escape of water (uniform circulation) and the air to enter. Plants put *very young* (small) into pots 4 inches diameter and 3 inches deep; as soon as the roots had reached the sides, in no degree matted, they were transferred to pots of *a foot in diameter* and 9 inches deep. Particular attention paid to the roots, having reason to think that the *compression* of them in the pot has under all circumstances, a tendency to accelerate the bloom. Under this treatment the plants became large and strong before they manifested a disposition to blossom. Plants placed within a few inches of the glass, and subject to similar heat as the Pine-apple plants."—*Hort. Trans., Nov.* 4, 1830.

*Remarks.*—The above instance of cultivation may be considered a full recognition of a progressive and accumulative system of cultivation, illustrating a rule to be observed in cultivation generally, that *maturity of growth* should be antecedent to, or contemporaneous with a development of bloom. It also points out the necessity of a mechanical arrangement of soil being equal to a uniform circulation. A rejection of the ordinary mode of repeated shifts is here decisive of the applicability of small growth to comparatively large masses of soil, if, in the first instance, adapted to the ultimate object, by arrangement, exposure to intense agency, &c.

The risk attendant upon "a compression" of the roots may be adduced as an additional evidence of the evils connected with repeated shiftings. If a slight "compression" of the roots tend to "interrupt" the circulation of fluid from the roots, what must be the effect of the whole inward resisting medium of smaller on larger pots? If "compression" interferes injuriously with ultimate effect, then all inverted growth must be subversive of the vital energy of plants.

On the Cultivation of the Pine-Apple.—"If the bark-bed could be made to give a steady heat (temperature of about 10 degrees below that of the day temperature of the air in the stove.) I readily admit that the plants would thrive better in a compost of that temperature than in a colder; for the temperature of the day being about

90° or 95°, and that of the night 70°, the mould in the pots will necessarily acquire nearly the intermediate temperature of 80°. It is true that two disturbing causes are in action—the evaporation from the mould and porous surface of the pots, and the radiant heat of the sun; but these causes operate in opposition to each other, and, probably, nearly negative the operation or influence of each other, as far as respects the temperature of the mould in the pots.

"I have never yet seen plants of the same age equally strong, nor any produce fruit better—so well swelled, nor so rich in flavour.

"But I have never taken off nor shortened a root, nor taken any other measure to retard the period of fructification, with the prospect of obtaining larger fruit; and my plants have always shewed fruit when 14 or 15 months old, though propagated from small and young suckers and crowns.

"The compost as before given for Cockscombs is the most stimulative of growth. Pine-plants will, however, grow perfectly well in composts of different kinds, but I have found that they have succeeded best when the materials have been fresh, and retaining their organic form; particularly if the pots be large relatively to the size of the plants, which I think they always ought to be, for the mode of cultivation recommended. I have used with advantage the haulm of Beans, cut into lengths of about an inch each. I found that the plants succeeded best in the warmest part of the house, where the flue first enters, and where the temperature is very high, varying from about 85° to 105°, and the air exceeding dry.

"Of Suckers. When the whole of the suckers are removed at an early period, one or more very strong suckers usually spring out below the level of the soil; and from these, suffering only one to remain attached to the parent stem, and preserving the roots as entire as possible, I have propagated with much advantage, and have obtained plants which shewed fruit strongly at seven months, dating from the period at which the sucker appeared like a strong head of Asparagus, at the surface of the soil."—*Hort. Trans.*, vol. iv., p. 543.

*Remarks.*—The foregoing statement appears to involve, and to a great extent, to illustrate, the principles upon which a progressive and accumulative system of cultivation depends; while speaking of the medium temperature that is most desirable, and of the opposing agencies of absorption by the mould and surface of pots, &c. with the radiant heat of the sun, I think that the balance or "negative" influence of these causes is more or less embodied in a former paragraph (p. 788,) where it is stated that a due exposure (of plants) to atmospheric and solar agency is requisite; that sentence alluding to "a balance of the power of absorption," &c.

The superior growth of the plants and the excellence of the fruit, compared with the age of the plants, is a sufficient proof of the superiority of an accumulative growth over an opposite treatment; and this instance, connected with another cited at the conclusion of the paper, wherein Mr. Knight refers to suckers showing fruit at seven months, may be adduced as an anticipation in practice of what I have advanced in theory (by the light of practice,) relative to the highest test of cultivation; namely, "that which attains the greatest constitutional vigour within a limited period." The very young state in which the suckers were removed further confirms the remarks at p. 710, that the vital functions of plants are diminished in force, in proportion as the primary development of their parts is prematurely hardened or matured, whether by the deficiency or excess of the elements which sustain them; and again, p. 734, "it is the elementary condition of an organised being which favours the ultimate development of its parts."

Mr. Knight admits not having "taken off, shortened," or otherwise disturbed the roots in the process of culture. I believe I may cite this as fully bearing me out in the principle I have laid down (p. 710,) as to the law or condition which is essential to perfect accumulative growth, namely, that "the accumulative vigour of all plants is exactly in proportion to the progressive agency of the cause to which they are first subjected," &c. &c. Indeed, the whole of this instance of cultivation appears to be in harmony with first principles. In the first place, we have proportions of compost, their texture and qualities, their mechanical structure (in pieces, &c.) and arrangement, so as to prevent impeded circulation—a method which supposes a union of several parts, adapted to a common end, and implies a principle of unity with progression, or, in other words, progressive transition without breach of continuity. This definition is, I conceive, strictly applicable to a system of cultivation which produces a progressive and accumulative effect, and strictly in harmony with the first principles of Horticulture, which affirm that "For the maintenance of a plant in health it is indispensable that the supply of fluid by the roots should be continued and uninterrupted. "The only means by which this continued and uninterrupted supply of fluid may be obtained will be by such a combination of materials, of their relative proportions, textures, qualities, arrangements, and exposure to certain agencies, as will be equal to maintain a regular progression of the functions of life, from the first development to maturity of growth. Such is the only law by which a comparatively perfect system of cultivation can be established. Every other process than that which involves unity of parts with progression of growth may be invariably conducive to inferior results, but the laws which govern organic and chemical affinities, will never allow it to be productive of the highest possible effects. A disorganization of vegetable structure is attended with a loss of functional power which no process can entirely re-establish.

"A few days after the annexed paper was read, I had the pleasure of observing (being on a visit to the President, &c.) the condition and appearance of the Pine-Apple plants described by him. The plants, which were then expecting to be shewing fruit in the next month, though young, were remarkable for their vigour and strength. They were grown in pots of much larger size than usual, which were raised so as to bring the upper leaves nearly in contact with the glass; the plants firmly rooted and leaves of peculiar breadth, &c.—*Hort. Trans.*, vol. iv. *Note by the Secretary.*

*Remarks.*—The above remarks afford additional evidence in favour of an accumulative system of cultivation, and though it is not stated that the plants were removed or transferred to such large pots in their youngest state, yet it is a close approximation to it, and may be considered illustrative of a paragraph at page 709, viz.:—"The leading feature of the former (accumulative) is found in its adaptation to attain a maturity of growth, apart from the aid of intermediate shifts, by removing plants in their youngest state to pots commensurate in size with their ultimate vigour and fertility." It also strongly corroborates the statement at page 734, that "The intensity of atmospheric and solar agency should be in proportion to the amount of material used in the process of potting, &c."

ON THE TRANSPLANTATION OF PLANTS WITH SPINDLE-SHAPED ROOTS.—"It is a generally received opinion amongst Gardeners, that plants with spindle-shaped roots cannot be advantageously cultivated by transplantation, and it cannot be questioned that the most perfect crops of plants of this habit, both in quantity and quality, will be obtained by permitting them to retain their first situation and position. Fibrous-rooted plants, also, I am inclined to infer, from the grounds above stated, will be found to succeed well under the same mode of treatment, for these would readily emit in great abundance new superficial roots." —*Hort. Trans.*, vol. vi., p. 370, (1826.)

The above evidence affords still further and clearer proofs, that a Progressive and Accumulative system of cultivation is the ultimate result of cultivation; although as previously stated in the instance of the Balsams, in which intermediate shifts were dispensed with, it did not occur to me at that period that such a system could ever be applied to the culture of plants of slow growth; yet a conviction that such a principle does really exist in nature, and would be ultimately successful in the treatment of plants *generally*, was my decided opinion from that period up to the present; and each successive instance of an approach to it has only served to confirm my expectations—that had the eminent experimentalist whose papers have done so much to illustrate and confirm all subsequent experience, been permitted to continue his valuable labours, I have no doubt but ere this, a clear conviction and practical insight into the ultimate effects of cultivation would have led him to affirm what I sincerely believe to be consistent with the principles of Horticulture, that, *physiologically* considered, *shifting* is but a *substitute* for a *worse evil.*

On the Cultivation of the Pine-Apple.—"Concluded a long course of experiments upon the cultivation of the Pine-Apple, and in ascertaining the effects of excess of drought and of moisture, and of very high and of very low temperature. I have of course sacrificed many plants in experiments, which I neither found nor expected to find successful; but from these experiments, &c., much valuable information was gained, &c. &c. &c."—*Hort. Trans.*, vol. vii., p. 40?, (1828.)

*Remarks.*—Such is the honorable testimony borne to the valuable results of philosophical research and inquiry, and it would be well if those who are attempting to apply the highest principles of Horticulture to practice, with but a very slender knowledge of the requisite means, would remember that the success of the latter must essentially depend upon the former.

"Very high temperature, if accompanied with a sufficiently humid state of the atmosphere, I found beneficial at all seasons of the year under a curvilinear iron house, for this admitted as much light in the middle of winter as the Pine-Apple plants appeared to require.

"The effects of the excess of humidity in the air of the house were, as might have been anticipated, diametrically opposite to those which had resulted from drought, and the plants grew so rapidly as to become soon too large for the spaces allotted, without indicating at any season of the year a disposition to show fruit."

*Remarks.*—The above statement appears to imply a difference of treatment in the cultivation of plants which to a certain extent admit of a progressive maturity of growth, as in many of those with a branching habit, and those whose maturity must depend upon a single accumulative development, as the Pine-Apple, Cockscomb, &c.,—the former not admitting of those artificial processes which render the current of sap subservient to fertility, by diverting its exuberant or perpendicular flow to the formation and support of every developed bud.

"I do not entertain the slightest doubt that as large and larger, and even still larger Pine-Apples may be raised without, than with, a hotbed of any kind. A requisite degree of temperature and humidity of atmosphere may be maintained by intense solar agency, &c. &c. &c."

In reference to the above, I may again cite the instance of the Balsams, which I subjected to intense heat and excessive moisture by syringing, apart from the aid of fermenting material throughout the whole process. Such was the exuberant growth on that occasion from the plants being transferred from 60-sized pots to 12-sized, that I had a repeated intention of again shifting them; but the stimulating material in which they were placed proved capable of imparting a vigour far exceeding the expectations of all who saw them, and though cultivated in houses whose structure was favourable only to a dry heat, yet the humidity which they were subjected to daily caused the protrusion of roots above the surface of the soil—a sufficient proof of the genial element and intense agency to which they were exposed.

"To obtain fruit of a much larger size, it will be found necessary to restrain the plants from bearing fruit to a greater age than mine have ever been permitted to acquire, and in such cases it will be found beneficial to remove the plants annually into larger pots. The difficulty of thus removing, without danger to the roots, &c."

*Remarks.*—Here it appears that Mr. Knight supposed it possible to attain a larger fruit by successive stages of growth. But I am strongly inclined to think that he here lost sight of the principle which he in part carried out, and that if he had then perceived the application of dispensing with all shifts—by the possibility of obtaining a uniform circulation of moisture from a larger amount of material, whether applied in larger pots, tubs, or proportionately sized pits—he would still have attempted it on a larger scale. It appears that his attempts on a small scale—yet then proportionately larger than others believed possible—were crowned with success. And here I would inquire whether his application of vegetable matter in a fresh or undecomposed state was at all favourable to the highest possible effect—whether its nutritive properties were not to a certain extent pernicious, not as an element capable of being assimilated by the roots, &c., but pernicious or unfavourable as a medium by which the remaining chemical agencies were to derive and impart their force? *Is not the efficiency of every cause to a certain extent modified or regulated in proportion to the* FITNESS *of the* MEDIUM *through which it operates?* If not, I am perfectly unable to establish a method in support of those principles of Horticulture upon which all that is true in cultivation depends.

Referring again to the materials used in the cultivation of the Balsams, I am convinced that the application of materials subservient to the highest possible effects of cultivation must answer a two-fold purpose, mechanical and nutritive, (or assimilative), and that the amount of material subservient to the latter purpose should only be in proportion to the progressively absorbent and digestive functions of each plant. I would even apply these views to the cultivation of such plants as are exposed to the most intense agencies; for this reason, that the amount of material equal to a given effect would be in proportion to the former —the more powerful the agent, the greater the amount of material, a plant could operate upon; and the greater the amount of material, the more essential that its qualities, proportions, arrangement, &c., should be rendered subservient to the progressive stages of growth I think it is by what I venture to call a mechanical medium that the law of gravitation operates, and it is the uniform operation of this law which constitutes the capability and power of uniform agency in all material bodies.

"It will also be necessary when fruit of the largest size is required, to place the plants at all periods of their growth at considerable distances from each other, because the leaves of the Pine-Apple plant act less efficiently in the generation of sap in proportion as they are made to take a perpendicular direction, and the direction they are compelled to take when they are laterally much shaded—for the leaves of this plant, like the stems of Potato-plants, are subjected to the conflicting influence of gravitation and of light—the one labouring to give a perpendicular, and the other a horizontal direction to the leaves and the comparative power of one agent increasing as that of the other decreases."

*Remarks.*—The above very instructive observations appear to inculcate the great importance of equalising the great opposing powers in Nature, and serve to afford the last confirmatory evidence in support of an opinion I have given in a previous paper on the essential importance of "a uniform circulation of moisture," as a principal medium by which the highest possible effects in cultivation are to be attained. As this condition will, ere this, have excited some little attention, and in some instances conjecture, as to the causes which operate to produce it, I beg to submit the following proposition to the consideration of cultivators:—

*A uniform circulation of the fluids necessary for the highest objects in Horticulture is the result of adapting the arrangement, proportions, textures, and qualities of the materials employed in cultivation, to the organic structure of plants, and the external agencies which operate upon them.*— WILLIAM WOOD.—*Gardener's Chronicle, for Nov.* 1843.

# *General Catalogue of Plants in the Honourable Company's Botanic Garden, Calcutta.*

## ACOTYLEDONES.

### FILICES.

Acrostichum flagelliferum.
,, emarginatum.
,, dimorphum.
Polypodium glabrum.
,, quercifolium.
,, proliferum.
,, altissimum.
Antrophyum sp.
Hemionitis cordifolia.
Pteris lunulata.
,, scandens, ×
,, sp.
Davallia multiflora, ×
,, sp.
Lygodium bicolor.
,, microphyllum.
,, sp.
Ophioglossum flexuosum,
,, cordifolium, ×

### MARSILEACEÆ.

Marsilea quadrifol

### SALVINIACEÆ

Salvinia cucullata.
,, imbricata.
,, verticillata.
Azolla pinnata.

### [illegible]

Tortula [illegible]ica.

### EQUISETEÆ.

Equisetum debile ×

## ACOTYLEDONES,—Continued.

### CHARACEÆ.

Chara involucrata.
,, verticillata.

## MONOCOTYLEDONES

### SCITAMINEÆ.

Zingiber officinale
,, Zerumbet, × ‡
,, pardocheilum, ‡
,, Cassumunar, × ‡
,, ligulatum, ‡
,, rubescens, ‡.
,, squarrosum, × ‡
,, panduratum, × ‡
,, capitatum, ‡
,, guttulatum, ‡
,, elatum, ‡ ×
,, barbatum, ‡
Curcuma Zedoaria, ‡
plicata, ‡
,, zerumbet, ‡
,, zanthorhiza, × ‡
,, cordata, ‡
,, elata, ‡ ×
,, glaucophylla, ‡
,, cœsia, ‡
,, attenuata, × ‡
,, parviflora, ‡
,, rubescens, ‡
,, comosa, × ‡
,, grandiflora, ‡
,, leucorhiza, × ‡
,, angustifolia, ‡
,, longa, ‡
,, Amada, ‡
,, montana, × ‡

× Signifies plants in the Distribution Nursery.
‡ Plants which ripen seed in the Botanic Gardens.

### SCITAMINEÆ.

Curcuma latifolia, ‡
,, reclinata, × ‡
,, ornata, ‡
,, cordifolia, ‡
,, œruginosa, ‡
,, ferruginea, ‡
Hitchenia glauca, × ‡
Kæmpferia Galanga, ‡
,, Roscoeana, × ‡
,, rotunda, × ‡
,, elegans, × ‡
,, angustifolia, × ‡
,, parviflora, ‡
,, pandurata, ‡
,, ovalifolia, ‡ ×
,, marginata, × ‡
Amomum dealbatum, × ‡
Hedychium carneum, ‡
,, angustifolium, × ‡
,, fastigiatum, ‡
,, spicatum, ‡
,, Gardnerianum, ‡
,, acuminatum, ‡
,, sulphureum, ‡
,, flavescens, ‡
,, ellipticum, ‡
,, giganteum, ‡
,, elatum, ‡
,, coccineum, ‡
Alpinia Galanga, ‡
,, Allughas, ‡
,, bracteata, ‡
,, nutans, ‡
,, calcarata, ‡
,, porrecta, ‡ ×
Hellenia cærulea.
Gastrochilus pulcherrimus.
,, affinis.
,, Jenkinsii.
Phæomeria magnifica.
Costus speciosus, ‡
,, nepalensis, ‡
,, argyrophyllus, × ‡
Globba marantina, × ‡
,, extensa, × ‡
,, bracteolata, × ‡
,, Careyana, × ‡
Mantisia saltatoria.
Scitaminea indeterminata.

### CANNEÆ.

Phrynium dichotomum, ×
,, bicolor, ×
,, zebrinum.
,, setosum.
,, cylindricum.
,, imbricatum.
,, capitatum, ×
,, parviflorum.
Maranta arundinacea, ×
,, ramosissima, ×
Canna Lamberti, × ‡
,, indica, × ‡
,, speciosa, × ‡
,, glauca, × ‡
,, coccinea, ‡
,, discolor, × ‡
,, flaccida, × ‡
,, flavescens, ‡
,, pallida, ‡

### MUSACEÆ.

Heliconia buccinata, ×
Strelizia augusta.
,, juncea,
Musa Sapientum.
,, paradisiaca, ×
,, coccinea, ×
,, ornata, ‡
,, superba, ‡
,, textilis, ×
,, glauca, × ‡
,, rubra, ×
,, Cavendishii, ×
Ravenala madagascariensis, ‡

### AMARYLLIDEÆ.

Curculigo orchioides, ×
,, recurvata,
,, sumatrana, ×
Hypoxys ovata.
Alstrœmeria pulchella.
Fourcroya tuberosa, × ‡
Agave Cantala, × ‡
,, lurida, × ‡
,, verrucosa, ‡
,, americana, ‡
Doryanthes excelsa.

### AMARYLLIDEÆ,—Continued.

Sprekelia Dalhousiei, ×
,, formosissima, ×
Hippeastrum ambiguum, × ‡
,, stylosum, ×
,, equestre v. majus, ×
,, ,, ,, semiplenum.
,, longe-pedunculatum.
,, spathaceum hybrid.
,, rutilo—Johnsoni.
,, pulverulentum.
,, Johnsoni.
,, reticulatum, × ‡
,, ——— var striatifolium.
,, vittatum.
,, bulbulosum var. rutilum.
,, reginœ—hybrid.
,, abvenum. ?
,, fulgidum.
Habranthus tubispatha, × ‡
,, rupestris, ‡
,, spathaceus, ×
Zephyranthes grandiflora.
,, candida, ‡
,, crinita, ×
,, rosea, × ‡
Coburgia variegata.
Pancratium zeylanicum.
,, longiflorum.
,, biflorum.
,, triflorum.
,, maritimum. ×
,, glacum.
,, carolinianum.
,, cariboeum, ×
,, amœnum.
Hyminocallis fragrans v. speciosa.
,, cariboea, ×
,, tinuiflora, ×
,, amæna.
,, angusta.
,, rotata.
Ismene calathina, ×
Eurycles amboinensis, ×
Calostemma luteum.
Hæmanthus pubescens.
Ammocharis coranica v. pallida.
Amaryllis reginæ.
,, equestris.
,, pulcherrima.

### AMARYLLIDEÆ,—Continued.

Amaryllis Belladona.
,, vittata.
,, longifolia.
,, aurea ?
,, corynensis.
,, aulica.
,, pulverulenta.
,, fulgens.
Crinum amænum, ×
,, erubesc. masson-capense.
,, defixum, × ‡
,, scabrum.
,, zeylanicum, ×
,, ,, capense-goven.
,, pratense var. longifolium, ×
,, pratense var. lorifolium.
,, erubesecenti—capense.
,, brevifolium.
,, careyanum, ×
,, canaliculatum.
,, canalifolium.
,, australe var. pedunculatum. ×
,, amabile, ×
,, rigidum,
,, toxicarium, × ‡
,, mauritianum.
,, nervosum.
,, procerum, ×
,, angustum, ×
,, speciosum, ×
,, ornatum zeylanicum.
,, ——— speciosum.
,, ——— Careyanum.
,, ——— Herbertianum.
,, capense.
,, ——— v. riparium.
,, moluccanum, ×
,, Govenianum.
,, Loddigesii.
Brunsvigia utingensis.
,, falcata
Nerine venusta.
,, undulata.
,, stellata.

### TACCACEÆ.

Tacca aspera, ‡
,, pinnatifida, ‡
,, lævis.

### IRIDEÆ.

Gladiolus sp.
,, ,,
,, ,,
Ixia sp.
,, ,,
,, ,,
Pardanthus chinensis, × ‡
Iris moræoides, ‡
,, chinensis, ×
,, stenopetala.
,, stenogyna ?
,, hungarica, ×
,, nepalensis, ×
Cipura paludosa, ×
,, plicata.
,, Northiana, ×
,, brasiliensis.
,, humilis.
Ferraria undulata.
,, Ferrariola.

### BROMELIACEÆ.

Bromelia Ananas, ×
,, bracteata, ‡
,, humilis, ‡
,, sylvestris, × ‡
,, Karottas, × ‡
,, sp.
,, sp.
Bilbergia bicolor.
,, pyramidalis v. bicolor.
,, zebrina.
,, humilis, ×
,, iridifolia, ×
Pitcairnia integrifolia, ×
,, bromelifolia, ×
,, latifolia.
,, staminea.
,, bracteata.
Tillandsia amæna.
,, acaulis.
,, sp.

### HYDROCHARIDEÆ.

Valisneria octandra, ‡

### HYDROCHARIDEÆ,—Continued.

Valisneria alternifolia, ‡
,, verticillata, ‡
Damasonium indicum, ‡

### ORCHIDEÆ.

Pleurothallis ophiocephala.
,, racemiflora.
Physosiphon Loddigesii.
Octomeria graminifolia.
,, Loddigesii,
Oberonia iridifolia.
Liparis cylindrostachya. ×
Otochilus fusca, ×
Pholidota imbricata, ×
,, pallida.
,, articulata, ×
Coelogyne cristata, ×
,, elata, ×
,, nitida, ×
,, decora, ×
,, barbata, ×
,, media, ×
,, undulata, ×
,, flavida, ×
,, fimbriata.
,, rigida, ×
,, præcox, ×
Megaclinium falcatum.
Bolbophyllum recurvum.
,, cocoinum.
,, umbellatum, ×
,, Careyanum, ×
,, leopardinum, ×
,, fuscescens.
,, serpens.
,, auricomum.
Cirropetalum Lindleyi.
,, vaginatum.
Eria flava, ×
,, stellata.
,, carinata,
,, Jenkinsii, ×
,, planicaulis, ×
(Agrostophylli sp.)
,, densiflora, ×
,, clavicaulis.

### ORCHIDEÆ,—Continued.

Aporum cuspidatum, ×
,, anceps.
Polystachya lutea.
Dendrobium Pierardi. ×
,, multicauli. ×
,, uncinatum.
,, villosulum.
,, cœrulescens.
,, Jenkinsii. ×
,, longicorne. ×
,, aggregatum. ×
,, moschatum. ×
,, calceolare. ×
,, œmulum.
,, cucullatum. ×
,, formosum. ×
,, Dalhousianum, ×
,, ungulatum.
,, chrysanthum, ×
,, densiflorum, ×
,, heterocarpum, ×
,, amœnum.
,, secundum.
,, carinulatum, ×
,, crumenatum.
Epidendrum ellipticum.
,, clavatum.
,, nutans.
,, crassifolium.
,, fuscatum.
,, cochleatum.
,, ciliatum.
,, umbellatum.
,, fragrans.
,, Harrisonianum.
,, nocturnum.
,, ciliare.
,, sp.
Brassavola cucullata.
,, trinervis.
Laelia autumnalis.
,, Barkeriana.
,, anceps.
Cattleya Forbesii.
,, Mossii v. superba.
,, citrina.
,, crispa.
Broughtonia speciosa.
Spathoglottis violacea.

### ORCHIDEÆ,—Continued.

Bletia verecunda.
,, florida.
,, hyacinthina.
Arundina bambusifolia, ×
Phaius Wallichii, ×
,, Tankervilliæ, ×
,, albus, ×
Acriopsis javanica.
Maxillaria densa.
,, rufescens.
,, decolor.
,, aromatica.
,, punctata.
,, squalens.
,, cruenta.
,, Barringtoniæ.
,, Harrisoniæ.
,, aurantiaca.
,, Parkeri.
,, picta.
,, nitidiflora.
,, tetragona.
,, parvula.
,, sp.
Batemannia Colleyi.
Catasetum luridum.
,, tridentatum.
,, pallidum.
,, sp.
,, sp.
Dicrypta Baueri.
Monachanthus viridis.
,, discolor v. viridiflorus.
Peristeria elata.
Cymbidium marginatum.
,, giganteum, ×
,, Mastersii, ×
,, aloifolium, ×
,, lancifolium, ×
,, triste.
Acropera Loddigesii.
Grammatophyllum Finlaysonianum.
Geodorum dilatatum.
,, pallidum.
Eulophia fusca.
,, exaltata.
Zygopetalum Mackai.
,, squalens.
Cyrtopodium Andersonii.

### ORCHIDEÆ.

Cyrtopodium cupreum.
Cyrtopera flava, ×
,, plicata. ×
Rodriguezia planifolia.
,, secunda.
Oncidium luridum.
,, Baueranum.
,, sybillatum.
,, Lanceanum.
,, Papilio.
,, ampliatum.
,, altissimum.
,, carthaginense.
,, sp.
,, sp.
Brassia Lanceana.
,, maculata.
,, candida.
,, sp.
Vanda cristata, ×
,, Roxburghii, ×
,, teres, ×
,, multiflora, ×
Renanthera coccinea, ×
Camarotis purpurea, ×
Appendicula javanica.
Saccolabium guttatum, ×
,, rigidulum.
,, pallens, ×
,, suaveolens.
,, papillosum, ×
,, carinatum.
,, denticulatum. ×
,, macranthum, ×
Sarcanthus oxyphyllus.
,, affinis.
,, pallidus.
Aerides odoratum, ×
,, affine, ×
,, refractum.
Œccoclades maculata.
Angræcum Richardianum.
,, subulatum.
,, carneum.
Gongora atropurpurea.
,, maculata.
Stanhopea insignis.
,, grandiflora.
,, eburnea.

### ORCHIDEÆ.

Stanhopea oculata.
Centrosia corymbosa.
Habenaria commelinifolia.
Platanthera decora.
,, Susannæ.
Pterogodium sulcatum, ×
Pogonia plicata, ×
,, viridiflora, ×
Neottia procera, ×
Hæmaria discolor.
Cypripedium venustum.
Arethusa benghalensis.
Vanilla aromatica, ×
,, planifolia, ×
Ornithocheilus striatulus.
About 24 other species unnamed.

### PALMÆ.

Chamædorea elegans.
Thrinax pumila.
Sabal Blackburnianum.
,, barbosum ?
,, Adansoni, × ‡
Licuala spinosa, × ‡
,, peltata, × ‡
Rhapis flabelliformis, ×
Chamærops Martiana, ×
,, humilis.
,, khasiyana.
Livistona ? mauritiana, × ‡
Corypha elata.
,, Taliera.
Corypha umbraculifera, ×
,, australis.
Phœnix dactylifera.
,, sylvestris, ×
,, paludosa, ×
,, farinifera.
,, acaulis, ×
,, lyroensis.
Calamus Rotang.
,, fascicularis, ×
,, extensus.
,, hostilis.
Zalacca edulis.
,, assamica.
Sagus Rumphii.
Borassus flabelliformis.

### PALMÆ,—Continued.

Latania borbonica.
Hyphæne coriacea.
Areca Catechu.
,, borbonica v. alba, ×
,, triandra, × ‡
,, oleracea.
,, lutescens, ×
,, sp.
Harina caryotoides, × ‡
Caryota urens, × ‡
,, sobolifera.
,, mitis, × ‡
Arenga saccharifera, × ‡
Cocos nucifera, ‡
,, flexuosa.
,, difrondessa ?
Desmoncus polyacanthus.
Bactris ciliosa.
Elœis guineensis.
Oreodoxa regia.
Nipa fruticans, ‡
and
Seven undetermined species.

### PONTEDEREÆ.

Pontedera vaginalis, ‡
,, plantaginea, ‡

### LILIACEÆ.

Gloriosa superba, ×
Lilium longiflorum, ‡
Fritillaria Thomsoniana,
Tulipa Clusiana, ‡

### SMILACINEÆ.

Hemerocallis cordata.
,, flava.
Agapanthus umbellatus.
Polianthes tuberosa, ×
Veltheimia viridiflora.
Allium fragans, ‡
,, sativum, ‡
,, Cepa, ‡
,, tuberosum, × ‡
,, nutans, ‡
,, spirale, ‡

### SMILACINEÆ,—Continued.

Ledebouria hyacinthina.
Scilla coromandeliana.
,, indica, ‡
Ornithogalum pinifolium.
,, caudatum, ‡
Drimia lanceœfolia.
,, media.
Eucomis undulata.
Anthericum tuberosum, ‡
,, Nimmoni.
,, vespertinum, ×
Asphodilus fistulosus.
Tulbaghia violacea.
Ophiopogon Wightianus, ‡
,, japonicus, ×
Peliosanthes petioralis.
,, viridiflora, ×
Asparagus officinalis.
,, acerosa.
,, racemosa, × ‡
,, ethiophagus.
Dianella ensifolia, ‡
,, nemorosa, × ‡
Dracœna angustifolia, ‡
,, ensiformis.
,, ferrea, × ‡
,, arborea.
,, terminalis, ×
,, brasiliensis.
,, umbraculifera.
,, spicata, ×
,, maculata, × ‡
,, australis.
,, reflexa, × ‡
,, cernua.
,, plicata.
,, stricta.
,, Helferiana, ×
,, marginata.
Sanseviera zeylanica, × ‡
,, sessiliflora, × ‡
Yucca glauca, ‡
,, aloifolia, ×
,, superba, ‡
,, serrulata.
,, gloriosa, ×
,, filamentosa.
,, ferruginea.
Xanthorrhœa hastilis.

### Smilacineæ,—Continued.

Eustrephus angustifolius, × ‡
Lomatophyllum macrum, ‡
,, borbonicum, ‡
Aloe barbadensis, × ‡
,, obscura, ×
,, attenuata.
,, abyssinica.
,, intermedia.
,, purpurascens.
,, saponaria, ×
,, arborescens, ×
,, coarctata.
,, humilis.
,, ferox.
,, Commelini.
,, foliosa.
Smilax latifolia, ‡
,, smyrnensis.
,, quadrangularis, ‡
,, maculata, ×
,, Sarsaparilla.
,, anceps.
,, macrophylla, ‡
,, stipulacea, ‡
,, prolifera, ‡
,, ovalifolia, × ‡
,, laurifolia, × ‡
,, lanceæfolia, ‡
,, baccillaris, ×
Tupistra nutans, × ‡
,, angustifolia, × ‡
,, urantiacea.

### Commelineæ.

Commelina communis, ‡
,, benghalensis, ‡
,, salicifolia, ‡
,, nudiflora, ‡
,, ionasma? ‡
Tradescantia discolor, × ‡
,, virginiana, ‡
,, fuscata.

### Butomeæ.

Butomus umbellatus.

### Alismaceæ.

Sagittaria verticillata, ‡
,, obtusifolia, ‡
,, sagittifolia, ‡
Alisma Plantago, ‡

### Junceæ.

Flagellaria indica, × ‡

### Dioscoreæ.

Dioscorea globosa, ‡
,, alata, ‡
,, rubella, ‡
,, purpurea, ‡
,, aculeata, ‡
,, fasciculata, ‡
anguina, ‡
,, nummularia, ‡
,, glabra, ‡
,, Dæmonum, ‡
,, pentaphylla, ‡
,, [illegible]ppeana, ‡

### Pandaneæ.

Pandanus moschatus, ×
,, lucidus,
,, gratissimus.
,, Meloni, ‡
,, amaryllidifolius, ×
,, crassipes, ‡
,, Candelabrum, ‡
,, dubius, ‡
,, fætidus, × ‡
,, furcatus, × ‡
,, utilis, × ‡
,, sp.

### Aroideæ.

Pistia Stratiotes, ‡
Ambrosinia spiralis,
,, ciliata,
Arum Colocasium,
,, viviparum.
,, indicum, ‡
,, odorum,

AROIDEÆ.—Continued.

Arum prælongum.
,, cucullatum.
,, fornicatum, ‡
,, flagelliferum, ‡
,, divaricatum, ‡
,, orixense, ‡
,, trilobatum, × ‡
,, sessiliflorum.
,, campanulatum, ‡
,, bulbiferum, †
,, margaritiferum, × ‡
[illegible]um.
[illegible]aforaceum.
[illegible]
sinuosum, ‡
[illegible]acum.
[illegible]uentum, ‡
marginatum, ‡
Dracontium triphyllum.
Caladium pictum.
Sauromatum guttat
Philodendron crassifolium.
[illegible] virosa.
oblongifolia.
[illegible]dyma.
[illegible]nathea, ×

[illegible]ata.
scandens, × ‡
officinalis.
acaulis.
Harrisii.
segetifolia.
Deppei.
,, obliqua.
,, cannifolia.
,, cordata, ×
,, gigantea, ×
,, decursiva.
,, pinnata.
,, sagittata.
Lasia aculeata, ‡
Acorus Calamus, ×
gramineus, ×

LEMNACEÆ.

Lemna orbiculata.

LEMNACEÆ,—Continued.

Lemna globosa.
,, cruciata.

ROXBURGHIACEÆ.

Roxburghia viridiflora, × ‡

TYPHACEÆ.

Typha elephantina.
,, angustifolia.

NAIADES.

Potamogeton indicus, ‡
,, tuberosus.

GRAMINEÆ.

Poa chinensis, ‡
,, cynosuroides, ‡
,, diandra, ‡
,, nutans, ‡
,, plumosa, ‡
,, multiflora, ‡
unioloides, ‡
,, gangetica, ‡
Festuca natans.
Aira filiformis, ‡
Eleusine Coracana, ‡
,, stricta, ‡
,, egyptiaca, ‡
,, indica, ‡
,, verticillata, ‡
,, calycina, ‡
Arundo Karka.
,, Donax v. versicolor.
Melica latifolia, ‡
Andropogon serratus, ‡
,, tenellus, ‡
,, conjugatus, ‡
,, filiformis, ‡
,, scandens, ‡
,, aciculatus, ‡
,, punctatus, ‡
,, muricatus, ‡
,, glaber, ‡
,, bicolor, ‡
,, Surdum? ‡

GRAMINEÆ,—Continued.

Andropogon saccharatus, ‡
,, laxus, ‡
,, Ischœmum, ‡
,, Nardus, ‡
,, halepensis, ‡
,, Schœnanthus, × ‡
Anthistiria ciliata.
,, polystachya.
,, arundinacea, ‡
Saccharum cylindricum.
,, spontaneum, ‡
,, fuscum.
,, semidecumbens.
,, canaliculatum.
,, Officinarum.
,, chinense.
,, procerum.
,, Sara.
Rottboellia perforata.
Manisuris granularis, ‡
Panicum spicatum.
,, glaucum.
,, holcoides.
,, interruptum.
,, Dactylon.
,, ellipticum.
,, ciliare.
,, cimicinum.
,, corymbosum.
,, brizoides.
,, fluitans.
,, lanceolatum.
,, stagninum.
,, Colonum.
,, cuspidatum.
,, setigerum.
,, repens.
,, hirsutum.
,, verticillatum.
,, italicum.
,, strictum.
,, hispidulum.
,, frumentaceum.
,, tenellum.
,, paludosum.
,, uliginosum.
,, sarmentosum.
,, miliare.
,, melicoides.

GRAMINEÆ,—Continued.

Paspalum, sp.
Bambusa arundinacea.
,, gigantea, ×
,, stricta.
,, Tulda.
,, Balcoora.
,, baccifera.
,, spinosa.
,, nana, ×

CYPERACEÆ.

Cyperus dubius.
,, monophyllus.
,, compressus.
,, difformis.
,, rotundus.
,, incurvatus.
,, tortuosus.
,, tenuiflorus.
,, Iria.
,, elongatus.
,, Pingori.
,, elatus.
,, verticillatus.
,, distans.
,, tegetus.
Scirpus tuberosus.
,, plantagineus.
,, acicularis.
,, bispicatus.
,, ischœmoides.
,, squarrosus.
,, diphyllus.
,, complanatus.
,, tetragonus.
,, quinquangularis.
,, anceps.
,, Kysoor.
Kyllinga monocephala.
,, umbellata.
Carex muricata, ×
,, sp.
Clematis Viticella.
,, flammea, ×
,, Gouriana, × ‡
,, cylindrica, ‡
,, grata.
,, integrifolia.

### CYPARACEÆ,—Continued.

Clematis Cadmia.
Naravelia zeylanica, ‡
Thalictrum foliolosum.
,, elatum.
Anemone nipalensis.
Knowltonia grandifolia.
Nigella indica, ‡
Delphinium Ajacis, ‡

### PAPAVERACEÆ.

Papaver somniferum, ‡
Argemone mexicana, ‡

### NYMPHŒACEÆ.

Euryale ferox.
Nymphæa alba
,, Lotus, ‡
,, versicolor.
,, cyanea, ‡
,, esculenta, ‡
,, stellata ‡

### NELUMBONEÆ.

Nelumbium speciosum, ‡

### MYRISTICEÆ.

Myristica moschata, ‡

### MAGNOLIACEÆ.

Michelia Champaca, ‡
,, Doltsopa, ‡
Magnolia grandiflora.
,, pumila.
,, fuscata.
Liriodendrum grandiflorum.
,, liliiflorum.
Magnoliacea.

### ANONACEÆ.

Anona squamosa, × ‡
,, reticulata, × ‡
,, muricata, × ‡
,, Cherimoli, × ‡
Uvaria undulata, × ‡

### ANONACEÆ,—Continued.

Uvaria odorata, × ‡
,, ventricosa, × ‡
,, sesquipedalis, ×
,, purpurea, × ‡
,, bicolor, ×
,, macrophylla, × ‡
,, bracteata.
,, rufa.
Guatteria cerasoides, ×
,, suberosa, ‡
,, longifolia, × ‡
,, velutina, × ‡
,, Badajamba, × ‡
,, fasciculata, × ‡
Unona longiflora, × ‡
,, dumosa, ‡
,, penduliflora.
,, lævigata.
,, dasymoschata.
,, pedunculata.
Artabotrys densiflora.
,, odoratissima, × ‡
Hyalostemma Roxburghii, × ‡
Kadsura japonica.

### DILLENIACEÆ.

Delima hebecarpa.
,, odorata.
Wormia dentata, × ‡
Dillenia augusta, × ‡
,, speciosa, × ‡
,, scabrella, × ‡
Colbertia coromandeliana, ‡

### UMBELLIFERÆ.

Anethum fœniculaceum.
,, Panmorium.
Coriandrum sativum, ‡
Panax cochleatum, ‡
,, digitatum.
,, suffruticosum, ×
,, fragrans, ×
,, aculeatum, ×
Hedera floribunda.
Aralia nudiflora, ×
,, digitata.
,, umbraculifera, ×

### ARALIACEÆ,—Continued.

Aralia obovata.
Sciodaphyllum pulchellum, ‡

### ESCALLONIEÆ.

Itea macrophylla.

### BERBERIDEÆ.

Berberis asiatica, ×
Nandina domestica, ×

### AMPELIDEÆ.

Cissus glauca, × ‡
,, quadrangularis, ‡
,, fœmina, ‡
,, elongata ‡
,, auriculata, × ‡
,, latifolia, ‡
,, lanceolaria, × ‡
,, pedata, ‡
,, carnosa, ‡
,, vitiginea, ‡
,, vinifera, ‡
,, indica, ‡
,, bracteolata, ×
,, capensis, ×
,, glaberrima, ×
Leea macrophylla, ‡ ‡
,, sambucina, ‡
,, Staphylea, ‡
,, hirta, ‡
,, crispa, × ‡
,, parallela, ‡
,, sanguinea, ‡

### PITTOSPOREÆ.

Pittosporum Tobira.
,, ,, v. variegatum,*×
,, ferrugineum.
,, undulatum.
,, verticillatum, ‡

### OLACINEÆ.

Olax scandens, ‡ ‡
,, imbricata.

### OLACINEÆ,—Continued.

Balanites ægyptiaca, ‡
Gomphandra axillaris.

### ONAGRARIÆ.

Fuchsia sp.
,, sp.
,, sp.
Œnothera stricta, ‡
,, mollissima, ‡
,, triloba, ‡
,, tetrapetala, ‡
,, odorata, ‡
,, rosea, × ‡
,, grandiflora, ‡
Jussieua repens, ‡
,, villosa, ‡
Trapa bispinosa, ‡

### HALORAGEÆ.

Myriophyllum verticillatum, ‡
,, tuberculatum, ‡
Serpicula verticillata, ‡

### COMBRETACEÆ.

Terminalia Catappa, × ‡
,, procera, × ‡
,, Fatrœa, × ‡
,, Bellerica, × ‡
,, Chebula, × ‡
,, angustifolia, × ‡
,, citrina, × ‡
,, Benzoin, ‡
,, oblonga, ‡
Pentaptera tomentosa, ‡
,, Arjuna, × ‡
,, glabra, ‡
,, bialata, × ‡
,, paniculata, × ‡
Getonia nutans, × ‡
Conocarpus latifolia, ‡
,, acuminata, ‡
Poivrœa pilosa, × ‡
,, coccinea, ×
,, Roxburghii, × ‡
,, densiflora.
Combretum decandrum, ‡

### COMBRETACEÆ,—Continued.

Combretum chinense, ×
,, extensum, ×
,, acuminatum, × ‡
,, costatum, × ‡
,, bullatum.
,, comosum.
,, Wightianum, ‡
Quisqualis indica, × ‡
Lumnitzera racemosa.

### ALANGIEÆ.

Alangium decapetalum, × ‡
Marlea begonifolia, × ‡

### RHIZOPHOREÆ.

Rhizophora gymnorhiza, ‡
,, decandra.
Carallia lucida, × ‡
,, lanceæfolia, × ‡

### MEMECYLEÆ.

Memecylon capitellatum, × ‡
,, tinctorium, × ‡

### MELASTOMACEÆ.

Melastoma erythrophyllum.
,, sp.
,, sp.
Arthrostemma lineatum.

### MYRTACEÆ.

Tristania megaphylla.
Melaleuca Leucadendron, ‡
,, Cajuputi, ‡
,, nodosa.
,, sp.
Eucalyptus resinifera.
Callistemon lophanthum.
,, lineare.
,, pinifolium.
,, lanceolatum.

### MYRTACEÆ,—Continued.

Metrosideros verus, ×
,, linearis, ‡
Psidium pomiferum, ‡
,, polycarpon, ‡
,, pyriferum, × ‡
,, Cujavillus, × ‡
,, guinense, × ‡
,, Cattleyanum.
Jossinia revoluta.
,, buxifolia.
,, elliptica.
Myrtus communis, ×
,, califlora.
,, tomentosa.
,, Pimenta, ×‡
Syzigium balsameum, ×
,, oleinum.
,, nervosum, × ‡
,, glomeratum.
,, fruticosum, ‡
,, myrtifolium, × ‡
,, inophyllum, ‡
,, tetragonum, ‡
Caryophyllus aromaticus.
Eugenia Jambolana, × ‡
,, cymosa, × ‡
,, grata, ‡
,, ximeniflora, ‡
,, lanceæfolia, ‡
,, buxifolia.
,, pulchella, × ‡
,, bifaria, ‡
,, bracteata, ×
,, brasiliensis.
Jambosa malaccensis, × ‡
,, purpurea, × ‡
,, polypetala, × ‡
,, ternifolia, × ‡
,, alba, × ‡
,, vulgaris × ‡
,, decora, ‡
,, aquea, × ‡
Careya sphœrica, ‡
,, herbacea, ‡
,, arborea, ‡
Barringtonia speciosa, ×
,, acutangula, × ‡
,, racemosa, × ‡
Fœtidia mauritiana, ×

### GRANATEÆ.

Punica Granatum, ✕ ‡
,, nana, ‡

### PHILADELPHEÆ.

Philadelphus coronarius.
Deutzia scabrella,

### CORNEÆ.

Cornus macrophylla, ✕
,, oblonga, ✕

### LORANTHACEÆ.

Loranthus bicolor, ‡
,, globosus, ‡

### CUCURBITACEÆ.

Cucumis trigynus, ‡
,, Colocynthis, ‡
,, Melo, ‡
,, sativus, ‡
,, Momordica, ‡
,, utilissimus, ‡
,, turbinatus, ‡
,, madraspatensis, ‡
,, integrifolius, ‡
Luffa pentandra, ‡
,, major, ‡
,, acutangula, ‡
,, graveolens, ‡
Bryonia scabrella, ‡
Trichosanthes anguina, ‡
,, dioica, ‡
,, lobata, ‡
,, palmata, ‡
Coccinia indica, ‡
Memordica Charantia, ‡
,, muricata, ‡
,, mixta, ‡
,, umbellata, ‡
Cucurbita Lagenaria, ‡
,, Pepo, ‡
,, Melopepo, ‡
,, Citrullus, ‡
Zanonia clavigera, ✕ ‡
,, integerrima.

### CACTEÆ.

Mammillaria pussilla, ✕
,, stylata.
,, erecta.
,, tenuis, ✕
Melocactus comigerus.
,, erectus.
Echinocactus Rhexii.
,, multiplex.
,, tubiflorus.
,, laniger.
,, erectus.
,, Seripium.
,, sp.
Cereus trigonus.
,, peruvianus, ✕
,, grandiflorus, ✕
,, triangularis,
,, tetragonus, ✕ ‡
,, speciosissimus, ✕
,, setosus, ✕
,, hybridus.
,, Jenkinsonianus.
,, truncatus, ✕
,, candidus.
,, niger.
,, lanuginosus.
,, nycticalus.
,, ciliosus.
,, extensus.
,, regalis.
,, jamaicensis.
,, anisogonus.
,, tortulanus.
,, mysurus.
,, matrinus.
,, loranthoides.
,, ovatus.
,, brasiliensis.
,, coccineus.
,, malacineus.
,, triqueter.
,, obtusus.
,, columnaris, ✕
,, multangularis.
,, repandus.
,, Deppei.
,, Bonplandii.
,, Virens.
,, subrepandus.

### CACTEÆ,—Continued.

Cereus Cummingi.
,, retusus.
,, nobilis.
,, Princeps.
,, Castus minor.
,, grandis.
,, gracilis.
,, Bidroida ?
,, hexagonus, ‡
,, sp.
Opuntia curassavica, ×
,, cochinilifer, × ‡
,, vulgaris, ×
,, polycantha.
,, Tuna, × ‡
,, brasiliensis, × ‡
,, Dillenii, ×
,, microdasys.
,, leucacephalus.
,, Stapelia.
,, senilis.
,, chilensis.
,, triacantha.
,, elatior, ×
,, spinosissima, ×
Pereskia aculeata, ×
,, Bleho, ×
Rhipsalis salicornoides, ×
Epiphyllum latifrons.
,, speciosum-rubrum.
,, marginatum.
,, grandiflorum—coccineum.
,, Vandesii.
,, Freesii.
,, alatum.
,, ciliare.
,, Russellianum.
,, Hitchinii.
,, Jenkinsonii.

### HOMALINEÆ.

Blackwellia spiralis, × ‡
,, fœtida, ×

### FICOIDEÆ.

Mesembryanthemum cordifolium, × ‡

### BEGONIACEÆ.

Begonia argyrostigma.
,, heracleifolia.
,, nitida.
,, reniformis, ‡
,, humilis, ‡

### CRUCIFERÆ.

Sinapis nigra, ‡
,, alba, ‡
,, dichotoma, ‡
,, glauca, ‡
,, rimosa, ‡
,, divaricata, ‡
,, patens, ‡
Raphanus sativus, ‡
Nasturtium montanum, ‡
Cochlearia Armoracia.
Erucago aspera ? ‡

### CAPPARIDEÆ.

Cleome viscosa, ‡
,, Chelidonii, ‡
,, pentaphylla, ‡
Niebuhria linearis.
,, oblongifolia, × ‡
Cratœva Roxburghii, × ‡
,, Nürvala, ‡
,, obovata, ‡
Capparis horrida, × ‡
,, zeylanica, ‡
,, sepiaria, × ‡
,, aphylla.
,, urophylla.
,, Heyneana.
Roydsia suaveolens.

### RESEDACEÆ.

Reseda odorata, ‡

### VIOLARIEÆ.

Viola cucullata, ×
,, suffruticosa.
,, primulifolia, × ‡
,, serpens, ×
,, odorata, ×

### VIOLARIEÆ,—Continued.

Ionidium suffruticosum, × ‡
Alsodeia benghalensis, ‡
,, Roxburghii, × ‡

### SAMYDEÆ.

Casearia coriacea, ×
,, Vareca.
,, glabra.
,, pentandra.
,, glomerata.
,, acuminata.
,, tomentosa.
,, fasciculata.
,, lanuginosa, ‡

### MORINGEÆ.

Moringa arabica, ‡

### PASSIFLOREÆ.

Passiflora laurifolia, × ‡
,, edulis, × ‡
,, quadrangularis, ×
,, incarnata-var.
,, fœtida, ‡
,, holosericea, ‡
,, minima, × ‡
,, alata.
,, racemosa.
,, Mayana.
,, cœruleo-racemosa.
,, lunata, × ‡
,, chinensis, ×
,, serratifolia, ×
,, bicolorata.
,, kermesina, ‡
,, incarnato-alba, ×
,, Herbertiana, ×
Murucuia ocellata, × ‡
Modecca triloba.
,, extensa, ×
,, palmata, ‡
,, furfuracea, ×

### PAPAYACEÆ.

Carica Papaya, × ‡

### FLACOURTIANEÆ.

Flacourtia inermis, ‡
,, cataphracta, × ‡
,, sepiaria, ‡
,, cordifolia, ‡
,, rotundifolia, ‡
,, ferox, ‡
,, Ramontchi.
,, sapida, × ‡
,, Stigmarota, ×
Roumea chinensis, × ‡
Phoberos Roxburghii, ‡
Choulmoogra odorata, ‡
Hydnocarpus inebrians.

### TURNERACEÆ.

Turnera trioniflora, × ‡
,, ulmifolia, × ‡

### BIXINEÆ.

Bixa Orellana, × ‡
,, purpurea, × ‡
Prockia Crucis, ×
Ludia spinosa, ×
,, fœtida, ×
Azara integrifolia, ×

### GUTTIFERÆ.

Mammea americana.
Garcinia cornea, × ‡
,, Cowa, × ‡
,, purpurea, × ‡
,, paniculata.
,, pedunculata.
,, Gambogia, × ‡
,, lanceæfolia.
,, porrecta, × ‡
,, celebica.
,, Mangostana.
,, dioica, × ‡
Xanthochymus pictorius, × ‡
,, dulcis, × ‡

### GUTTIFERAE,—Continued.

[illegible]anthochymus ovalifolius, × ‡
Mesua ferrea, ×
Calophyllum Inophyllum, × ‡
,, Tacamahaca.
,, sp.
Canella alba, ×

### HYPERICINEAE.

Hypericum chinense, ×
Ancistrolobus carneus, × ‡
,, eugenifolius, ‡
,, prunifolius.

### TERNSTROMIACEAE.

Cochlospermum gossypinum, × ‡
Saurauja fasciculata.
Camellia japonica.
,, sp.
Thea viridis.

### ACERINEAE.

Acer oblongum, × ‡
,, Negundo. ×

### SAPINDACEAE.

Cardiospermum canescens, × ‡
,, Halicacabum, ‡
Paullinia carthaginensis.
,, brasiliensis.
Schmidelia serrata.
,, dentata.
,, racemosa.
Sapindus emarginatus, × ‡
,, laurifolius.
,, angustifolius.
,, detergens, × ‡
,, Saponaria, ×
,, rubiginosus, ×
,, fruticosus, ×
,, polyphyllus.
,, acuminatus.
Cupania alternifolia.
,, lœvis.
,, canescens, ×
,, sapida, ×

### SAPINDACEAE,—Continued.

Stadmannia Sideroxylon.
Tina madagascariensis.
Harpullia cupanioides.
Pievardia sapida.
,, dulcis.
Nephelium Litchi, ×
,, Longan, ×
,, variabile, ×
,, rubrum, ×
,, verticillatum.
Scytalia Rambutan.
Melicocca bijuga, × ‡
,, diversifolia.
,, sp.
Dodonœa burmanniana, × ‡
Cossignea borbonica, ‡
Schleichera trijuga, × ‡
Millingtonia simplicifolia, × ‡

### HIPPOCASTANEAE.

Æsculus punduanus.

### POLYGALEAE.

Polygala arvensis, ‡
Securidaca paniculata, × ‡

### ELATINEAE.

Bergia verticillata, ‡
,, ammanioides, ‡

### LINEAE.

Linum trigynum, × ‡
,, tetragynum, × ‡
,, usitatissimum, ‡

### STERCULIACEAE.

Sterculia pallens, × ‡
,, ornata, ‡
,, Balanghas, × ‡
,, urens, × ‡
,, colorata, × ‡
,, comosa, ×
,, heterophylla, ×
,, acidifolia.

### STERCULIADEAE,—Continued.

Sterculia villosa, × ‡
,, platanifolia.
,, alata, × ‡
,, guttata, × ‡
,, lanceœfolia, ‡
,, coccinea, × ‡
,, parviflora.
,, angustifolia, ‡
,, fœtida, × ‡
,, populnifolia, × ‡
,, campanulata, × ‡
Heritiera minor, × ‡
,, macrophylla, × ‡
,, acuminata.
Ochroma Lagopus, ‡
Helicteres Isora, × ‡
,, pulchella, × ‡
,, spicata, q
,, angustifolia, × ‡
,, virgata, × ‡
,, elongata, × ‡
,, hirsuta, × ‡
Bombax Ceiba, ‡
,, pentandrum, ‡
,, heterophyllum, ‡
,, malabaricum, ×
Adansonia digitata, × ‡
Pentapetes phœnicea, ‡
Dombeya acutangula.
,, undulata.
,, astrapœoides.
,, tiliœfolia.
,, palmata.
Pentaglottis tomentosa, ‡
Actinophora fragrans.
Pterospermum suberifolium, × ‡
,, acerifolium, × ‡
,, acuminatum.
,, semisagittatum, × ‡
,, lanceœfolium, × ‡
,, aceroides, × ‡
,, reticulatum, ‡
Astrapœa Wallichii.
Kydia calycina, × ‡
,, fraterna.
Eriolœna Wallichii.
,, Hookeri.
Microchlœna spectabilis, ×
Theobroma Cacao, ‡

### STERCULIACEAE,—Continued.

Abroma augnstum, × ‡
Guazuma tomentosa, × ‡
Commersonia echinata, ‡
Byttneria pilosa, ×
,, aspera, × ‡
,, catalpifolia.
,, ovata, ×
,, sp.
Kleinhovia Hospita, × ‡
Melochia tiliœfolia, ‡
Glossospermum pyramidale, ‡
,, velutinum, × ‡
Riedleia guazumifolia, × ‡
,, borbonica, ‡
,, corchorifolia, ‡
Waltheria indica, ‡
,, velutina, ‡

### MALVACEAE.

Malva polystachya, ‡
scoparia, ‡
,, mauritiana, ‡
,, peruviana, ‡
,, caroliniana, ‡
Malvaviscus arboreus, × ‡
Althœa rosea, ‡
Malachra fasciata, ‡
,, capitata, ‡
,, heptaphylla, ‡
Urena lobata, ‡
,, macrocarpa, ‡
,, sinuata, ‡
,, lappacea, ‡
,, regida, × ‡
,, tricuspis, ‡
Sida nudiflora, ‡
,, angustifolia, ‡
,, macrophylla, ‡
,, acuta, ‡
,, humilis, ‡
,, polyandra.
,, lanceolata, ‡
,, retusa, ‡
,, rhomboidea, ‡
,, rhombifolia, × ‡
,, cordifolia, ‡
,, crispa, ‡
,, tomentosa,

MALVACEAE,—Continued.

Sida horrida, ‡
,, asiatica, ‡
,, indica, ‡
,, graveolens, ‡
,, mollis, × ‡
,, cristata, ‡
,, arida, × ‡
,, montana, ‡
,, periplocifolia ‡
Abutilon striatum, × ‡
Lagunœa Patersonia, ×
,, lobata, ×
Anoda hastata, ‡
Pavonia odorata, ‡
,, rosea, ‡

MALVACEAE,—Continued.

Rovonia zeylanica, ‡
Hibiscus populneus, × ‡
,, populneoides, × ‡
,, Lindleyi, × ‡
,, tortuosus, × ‡
,, macrophyllus, × ‡
,, Rosa sinensis, ×
,, phœniceus, × ‡
,, syriacus, × ‡
,, rigidus, ‡
,, peruvianus.
,, Lampas, × ‡
,, culinus, ‡
,, vitifolius, ‡

*(To be continued.)*

### *Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of November*, 1843.

| *November.* Days of the Month. | Moon's Changes. | Moon's Horizontal Parallax at Noon. | Observed at 9 H. 50 M. | | | | | | Observed at 4 P. M. | | | | | | Rain Gauges. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Temperature. | | | Wind. | | | Temperature. | | | Wind. | | | |
| | | | Barometer. | Of the Mercury. | Of the Air. | Of an Evapg. Surface. | Direction. | Aspect of the Sky. | Barometer. | Of the Mercury. | Of the Air. | Of an Evapg. Surface. | Direction. | Aspect of the Sky. | Upper. | Lower. |
| | | | Inches | o | o | o | | | Inches | o | o | o | | | Inches | Inches |
| 1 | | 55 | 30,041 | 78,5 | 82,2 | 74,5 | N. W. .... | Cumuli. | 29,954 | 80,0 | 84,4 | 74,5 | N. ........ | Clear. | | |
| 2 | | 55 | ,042 | 77,0 | 80,8 | 74,0 | N. ......... | Clear. | ,930 | 79,5 | 82,7 | 76,5 | N. ........ | Generally Clear. | | |
| 3 | | 54 | ,005 | 77,2 | 80,7 | 76,0 | N. W. .... | Clear. | ,918 | 79,5 | 84,0 | 77,0 | N. W....... | Clear. | | |
| 4 | | 54 | ,005 | 78,0 | 80,0 | 74,4 | N. ......... | Clear. | ,890 | 80,9 | 85,0 | 78,0 | N. W....... | Clear. | | |
| 5 S. | | 54 | 29,989 | 78,5 | 82,0 | 76,5 | N. E. ...... | Cumuli. | ,905 | 81,1 | 85,0 | 78,8 | N. ........ | Clear. | | |
| 6 | | 54 | 30,025 | 77,8 | 80,4 | 75,3 | N. ........ | Clear. | ,933 | 84,0 | 84,2 | 78,0 | N. ........ | Clear. | | |
| 7 | ○ | 54 | 29,978 | 77,5 | 80,0 | 75,0 | N. .. ...... | Cumuli. | ,877 | 80,0 | 83,0 | 77,0 | N. ........ | Clear. | | |
| 8 | | 54 | ,953 | 77,8 | 80,5 | 75,0 | N. ........ | Clear. | ,877 | 81,0 | 83,9 | 75,0 | N. ........ | To the N. E. Cumulo-strati. | | |
| 9 | | 54 | ,953 | 77,2 | 80,0 | 74,6 | N. ........ | Clear. | ,875 | 80,0 | 82,1 | 76,0 | N. ........ | Cumulo-strati. | | |
| 10 | | 55 | ,978 | 75,8 | 78,2 | 74,0 | N. W....... | Clear. | ,882 | 79,8 | 82,0 | 76,7 | N. ........ | Clear. | | |
| 11 | | 55 | ,974 | 75,8 | 78,4 | 73,0 | N. ........ | Clear. | ,894 | 79,2 | 82,5 | 76,0 | N. W....... | Clear. | | |
| 12 S. | | 56 | ,958 | 75,2 | 80,0 | 74,2 | N. ........ | Clear. | ,882 | 77,8 | 83,0 | 76,0 | N. E. ...... | Clear. | | |
| 13 | | 56 | ,957 | 76,0 | 79,8 | 74,0 | N. W. .... | Clear. | ,886 | 80,0 | 82,5 | 76,0 | S. W....... | Generally Clear. | | |
| 14 | | 57 | ,897 | 76,4 | 79,0 | 74,2 | W. ........ | Generally Clear. | ,841 | 80,5 | 84,0 | 75,0 | W. ......... | Clear. | | |
| 15 | ☾ | 58 | ,849 | 77,0 | 79,8 | 74,8 | W. ........ | Clear. | ,797 | 81,0 | 84,5 | 76,4 | N. W....... | Clear. | | |
| 16 | | 59 | ,890 | 76,2 | 79,7 | 76,0 | N. ....... | Clear. | ,824 | 80,0 | 82,0 | 77,0 | N. ........ | Cirro-Cumuli. | | |
| 17 | | 60 | ,862 | 75,8 | 79,0 | 76,0 | N. ........ | Clear. | ,785 | 79,4 | 82,0 | 77,0 | N. ........ | Cumuli. | | |
| 18 | | 60 | ,906 | 76,0 | 79,0 | 75,0 | W. ........ | Clear. | ,829 | 82,0 | 82,0 | 78,0 | W. ........ | Cumuli. | | |
| 19 S. | | 51 | ,940 | 75,5 | 80,4 | 74,0 | W. ........ | Clear. | ,860 | 80,1 | 83,0 | 75,8 | N. ........ | Clear. | | |
| 20 | | 61 | ,973 | 74,8 | 78,0 | 73,2 | N. W. .... | Clear. | ,865 | 79,0 | 82,0 | 75,0 | N. ........ | Clear. | | |
| 21 | ● | 61 | ,895 | 74,8 | 76,5 | 72,5 | N. ........ | Clear. | ,800 | 78,2 | 81,0 | 76,0 | N. ........ | Generally Clear. | | |
| 22 | | 61 | ,855 | 75,0 | 78,0 | 73,7 | N. W. .... | Clear. | ,797 | 78,5 | 82,0 | 76,2 | N. ........ | Generally Clear. | | |
| 23 | | 60 | ,918 | 75,0 | 77,0 | 73,2 | N. ........ | Clear. | ,817 | 77,2 | 80,0 | 74,4 | N. ........ | Cumuli. | | |
| 24 | | 59 | ,926 | 75,0 | [illegible],3 | 72,8 | N. W. .... | Clear. | ,846 | 77,4 | 80,0 | 72,8 | N. W. .... | Clear. | | |
| 25 | | 58 | ,989 | 73,0 | 75,8 | 70,0 | W. ........ | Clear. | ,890 | 75,0 | 78,0 | 71,0 | N. ....... | Clear. | | |
| 26 S. | | 57 | ,930 | 71,4 | 74,0 | 69,0 | N. ........ | Clear. | ,838 | 74,9 | 80,0 | 74,0 | N. ........ | Cumuli. | | |
| 27 | | 56 | ,900 | 73,0 | 76,0 | 70,0 | N. ........ | Clear. | ,838 | 76,2 | 80,0 | 73,8 | N. ........ | Clear. | | |
| 28 | | 56 | ,938 | 72,9 | 75,8 | 70,0 | N. ........ | Clear. | ,860 | 75,5 | 78,5 | 72,1 | N. W....... | Clear. | | |
| 29 | ☽ | 55 | ,902 | 70,8 | 72,8 | 64,8 | N. (sharp).. | Clear. | ,826 | 75,0 | 79,2 | 73,0 | N. W....... | Clear. | | |
| 30 | | 54 | ,881 | 71,0 | 73,0 | 68,2 | N. (sharp).. | Generally Clear. | ,802 | 75,0 | 79,8 | 74,2 | N. E. ...... | Generally Clear. | | |

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*Capital £500,000 in 5,000 Shares of £100 each.*

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| Aged when Policy was issued. | Date of Policy. | Sum Assured. | Original Premium. | Reduction. | Annual Premium payable in 1844. |
|---|---|---|---|---|---|
| | | Co.'s Rs. | Rs. | Rs. | Rs. |
| 20 | May, 1838 | 10,000 | 420 | 210 | 210 |
| 30 | ,, | 10,000 | 480 | 240 | 240 |
| 40 | ,, | 10,000 | 590 | 295 | 295 |
| 50 | ,, | 10,000 | 740 | 370 | 370 |
| 60 | ,, | 10,000 | 1,030 | 515 | 515 |

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11.—In all cases of reduction to the English rate, the Policies are to be subject to all the regulations and conditions affecting English Policies.

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16.—All applications for assurance must be accompanied by a Medical Fee of eight rupees.

17.—The Tables, Blank Forms, and other particulars, requisite to enable persons to effect Assurances, may be had on application to the Agents.

By Order of the Directors,
BAGSHAW AND CO., Agents and Secys.

# THE JOURNAL

OF THE

# Agricultural & Horticultural Society

OF

# INDIA.

## No. XII.—1843.—Vol. II.

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## *Report on the cultivation and manufacture of. Tea in Kemaon. By* WILLIAM JAMESON, ESQ. *Superintendent Botanical Gardens, North-Western Provinces.*

*To* JAMES HUME, *Esq. Secretary to the Agricultural and Horticultural Society, Calcutta.*

General Department, North-Western Provinces.

SIR,—I am directed by the Honorable the Lieutenant-Governor, North-Western Provinces, to transmit to you the accompanying copy of a report from Dr. Jameson, regarding the cultivation and manufacture of tea in Kemaon, with a view to its publication in the Transactions of the Agricultural and Horticultural Society in Calcutta, if it is considered to be possessed of sufficient interest.

I have, &c.

J. THORNTON,

*Secretary to Government, North-Western Provinces.*

*Agra, 27th March,* 1844.

1. The nurseries of Kemaon, as the Honorable the Lieutenant-Governor is aware, are situated in the districts of Bheemtal, Now Chourcheetal, Almorah, and Hawaulbaugh. In the 1st is the nursery of Bhurtpore; 2nd, Russeeah; 3rd, Kupeena and Lutchmesir; and 4th, Hawaulbaugh. The following will shew the quantity of ground occupied by each :—

| *District:* | *Names of Nurseries.* | *Acres of Land.* |
|---|---|---|
| Bheemtal, .............. | Bhurtpore, ........... | 2 Acres. |
| Now Chourcheetal,... | Russeeah, ............... | 27 ditto. |
| Almorah,............... | Kupeena, ... 4<br>Luchmesir, ... 6 | ... 10 ditto. |
| Hawaulbaugh, ......... | Hawaulbaugh, ......... | 16 ditto. |

2. The Hawaulbaugh nursery was established during the last rainy season. In these nurseries, we have the following number of plants :—

| Name of Nurseries. | Number of Tea bearing plants | No. of plants which will bear Tea in the ensuing season. | Number of Tea plants transported in 1843. | Number of seedlings ready for transporting. | Number of layers ready for removal. |
|---|---|---|---|---|---|
| Bhurtpore, | 1,460 | ,, | 1,201 | 8,171 | 500 |
| Russeeah, | ,, | 17,000 | 1,000 | 37,000 | ,, |
| Lutchmesir, | 1,546 | ,, | 4,500 | 34,120 | 400 |
| Kupeena, | 1,300 | ,, | 5,500 | 17,000 | ,, |
| Hawaulbaugh, | ,, | 10,000 | ,, | ,, | ,, |
| Total, | 4,306 | 27,000 | 12,201 | 96,291 | 900 |

3. From the above table it appears, that the increase of young tea seedling plants during the last season has been 1,12,392, or equal to four times the number reared since the nurseries were first established in 1835-36. Of these,

however, 12,201 have been already planted out in different nurseries, leaving 97,191 for transplanting. These, giving five feet to each plant, will cover about 56 acres of land. In compliance with the permission granted to me by Government, I marked out a new nursery of 35 acres (*kova-kesar*) in the neighbourhood of Bheemtal, the land having been made over to me for the purpose by the Commissioner, from whom and his assistant I beg to remark, that I have received every assistance. A second, of 20 acres, in the neighbourhood of Hawaulbaugh. As Mr. Batten was about to make a new settlement of the land in the neighbourhood of Russeah, I requested him to set aside ten acres in addition to those already covered with tea. Here too in the neighbourhood of the Tal of Now Courchee, there is much land admirably adapted for extending the nursery when plants for the purpose are ready. I have also added about an acre to the Kupeena nursery.

4. In selecting land for the new nurseries, I have paid due consideration to the geological structure of the districts, soil, locality, &c., and have selected places similar to those that are considered good localities in China for the Tea plant. The geological structure of the Kemaon province is highly interesting. At the foot of the hills we first meet with the saliferous system, consisting of red and green marl, sandstone, bituminous marl slate, imbedded in the marl; enormous beds of gypsum or sulphate of lime occur, highly valuable in the arts, and which might be obtained here in any quantity, and a bituminous slate clay, which abounds with alum or sulphate of alumina. This rock is of high importance, as from it a vast deal of the alum of commerce is procured. At Kalabaugh, on the banks of the Indus, there are 14 manufactories, with from 12 to 18 men in each, engaged in making alum from it: when made, the alum is sold at the manufactory for about Rs. 19 per camel load. It is therefore well worthy of the attention of Government, as the alum slate

occurs in inexhaustible beds, in Kemaon. The saliferous system rests upon a series of clay slates belonging to the transition series; the magnesian limestone, carboniferous and old red sandstone series, being entirely wanting. In several localities, but particularly in the neighbourhood of Bheemtal, greenstone is found bursting through and altering the Neptunean strata. From this locality, on to about three miles of Almora to the Neptunean rocks, consists of alternations of clay slate and mica slates, with enormous beds of quartz rock, all highly inclined, and dipping at angles varying from 25° to 70° to the east of north. About three miles distance from Almorah, we meet with granite, which here forms mountains of considerable elevation. On passing the granite, we again meet with clay and mica slates, with imbedded quartz rock, which form the whole neighbourhood of Almorah and Hawaulbaugh. Such is a rapid and general view of the geology of that province as far as Hawaulbaugh. We shall take another opportunity of giving a more detailed account.

5. From this general view, however, it will be perceived, that we have in the tea districts in Kemaon, a geological structure similar to what exists in the best tea districts in China. The soil too as there, is generally light, and of a silico-aluminous nature, and abounding with mica, which originates from the decomposition of clay and mica slates in which it is met.

6. The following table will give at one view the quantity of land being, and about to be, brought into cultivation with tea plants:—

| *Name of Nurseries.* | *Acres of Land.* |
|---|---|
| Kova-ke-sar, | 35 acres. |
| Russeeah, | 10 ditto. |
| Kupeena, | 1 ditto. |
| Hawaulbaugh, | 20 ditto. |

7. To bring the above land into cultivation, it will be necessary to make a considerable increase in the establishment of malees. The old establishment was as follows:—

| *Name of Nurseries.* | *Chuprassees.* | *Mallees.* |
|---|---|---|
| Russeeah, | 1 | 17 |
| Bhurtpore, | 0 | 3 |
| Kupeena, | 0 | 3 |
| Lutchmesir, | 0 | 3 |

8. But there being no responsible person always present, the distance intervening between the different districts (35 miles) rendering it impossible for the overseer to be so, I appointed a chowdry to each nursery, and reduced the number of hill mallees. Their excellent and thriving condition point out the beneficial results of this plan.

9. The following establishment, which has been formed with the utmost economy consistent with efficiency, I beg to recommend for the nurseries:—

| | | *Rs.* | *As.* | *P.* | | | |
|---|---|---|---|---|---|---|---|
| Bhurtpore, ... | 1 Chowdry, | 8 | 0 | 0 | | | |
| | 2 Mallees, at Rs. 4, | 8 | 0 | 0 | | | |
| | | | | | 16 | 0 | 0 |
| Kova-ke-sar, | 1 Chowdry, | 8 | 0 | 0 | | | |
| | 1 Assistant Chowdry, | 7 | 0 | 0 | | | |
| | 17 Mallees, at Rs. 4, | 68 | 0 | 0 | | | |
| | | | | | 83 | 0 | 0 |
| Russeeah, ... | 1 Chowdry, | 12 | 0 | 0 | | | |
| | 17 Mallees, at Rs. 4, | 68 | 0 | 0 | | | |
| | | | | | 80 | 0 | 0 |
| Kupeena, ...... | 1 Chowdry, | 8 | 0 | 0 | | | |
| Lutchmesir,.. | 3 Mallees, at Rs. 4, | 12 | 0 | 0 | | | |
| | 3 Ditto ditto, Rs. 4, | 12 | 0 | 0 | | | |
| | | | | | 32 | 0 | 0 |
| Chullar, ...... | 1 Chowdry, | 8 | 0 | 0 | | | |
| | 7 Mallees, at Rs. 4, | 28 | 0 | 0 | | | |
| | | | | | 36 | 0 | 0 |
| | Total, | | | Rs. | 247 | 0 | 0 |

10. I have considered it necessary to recommend an assistant chowdry to Kova-ke-sar nursery from its extent, and the necessity of having the land brought into cultivation as soon as possible. As a temporary arrangement, I have employed 20 mallees in the Kova-ke-sar nursery, since 5th January 1844, and 8 in the nursery at Hawalbaugh, so that a considerable quantity of land might be ready to receive the young tea plants in March.

11. *Gathering of Tea Leaves.*—The tea leaves are gathered by the mallees of the establishment under the direction of the China-men. The seasons for doing so and making tea are April, June, July, September, and October, which may be styled the spring, rainy (summer,) and autumn crops: much the largest quantity was collected in the rainy season, seeing that of the 190 lbs. of tea manufactured during the year, 141 lbs. were then made.

12. The following table exhibits the quantity of tea manufactured during the last year, and the nurseries that afforded the leaves:—

| Date. | Name of the Nurseries. | Coarse Tea. | | Fine Tea. | | Total. | | Grand Total. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Pound. | Ounce. | Pound. | Ounce. | Pound. | Ounce. | Pound. | Ounce. |
| 1843. | | | | | | | | | |
| April, ...... | Lutchmesir, | 1 | 8 | 20 | | 22 | ,, | ,, | ,, |
| Do. ......... | Bhurtpore, ... | ,, | 8 | 8 | ,, | 8 | 8 | | |
| Do. ......... | Kupeena, ... | ,, | 8 | 7 | ,, | 7 | 8 | 38 | ,, |
| June, July, | Lutchmesir, | 9 | 12 | 35 | 8 | 45 | 4 | | |
| Do. Do. | Kupeena, ... | 6 | 8 | 15 | ,, | 21 | 8 | | |
| Do. Do. | Bhurtpore, ... | 7 | 8 | 15 | 8 | 23 | ,, | | |
| Do. Do. | Russeeah, ... | 2 | 8 | 7 | ,, | 9 | 8 | 99 | 4 |
| Sept. Oct. | Lutchmesir, | 6 | 13 | 21 | 6½ | 28 | 3½ | | |
| Do. Do. | Russeeah, ... | 1 | 10 | 7 | 4 | 8 | 14 | | |
| Do. Do. | Kupeena, ... | 2 | 2½ | 6 | 2 | 8 | 4½ | | |
| Do. Do. | Bhurtpore, ... | 1 | 2 | 7 | 5½ | 8 | 7½ | 53 | 13½ |
| | Total, ...... | ,, | ,, | ,, | ,, | ,, | ,, | 191 | 1½ |

13. The number of tea-bearing plants amounted last year to 4366. In the ensuing season, nearly the whole of the plants in the Russeea, and a great number of those in the Hawaulbaugh nurseries will also afford leaves.

14. In the space of a few days, the tea manufactured will be transmitted to the Secretary to the Government of Bengal, with the invoice, in compliance with the orders contained in Mr. Secretary Hamilton's letter No. 965, dated 30th August last. The delay of doing so has been owing to the want of the tea canisters, which were indented for in October 1842, but which only reached Almorah in January last.

15. I beg to draw the attention of the Honorable the Lieutenant Governor to the want of implements for manufacturing green tea. It is now nearly 18 months since I transmitted my first indent. I again transmitted another on the 7th December last. The Assam Tea Company have but one set, it will therefore be necessary to procure them from China. That the implements could be made at Almorah, provided that patterns could be procured, is no doubt probable, though the Chinamen maintain that they could not, as all the baskets, &c. required in the manufacture of black tea are now there made by the establishment, regarding which, they also made a similar statement. At Almorah or in the Upper Provinces, the cast metal pans are not procurable. It will be much to be regretted if another season is allowed to pass, without ascertaining the value of the tea plant leaf for manufacturing green tea. I also respectfully beg to draw the attention of the Honorable the Lieutenant Governor to the absolute want of a tea-chest-maker. Such a person could possibly be procured in Calcutta, or if not, in Canton. If, however, in the former, a first rate person could not be procured, it would be desirable at once to obtain one from the latter. In England almost as much attention is paid to the manner in which the tea is packed as to its quality; moreover, if this is not properly done, its flavour is apt to

be deteriorated. Under these circumstances it is absolutely necessary, that a case-maker be appended to the establishment. If this should meet with the approval of the Honorable the Lieutenant Governor, I shall make the necessary enquiries.

16. *Manufactory.*—The building ordered* to be repaired at Hawalbaugh, for the purpose of a manufactory, will be ready in the course of next month. As soon as the new implements reach Kemaon, it would be most desirable to erect a second manufactory in the neighbourhood of Bheemtal, as the distance to which the leaves have to be carried (35 miles) to the Hawalbaugh manufactory, has a prejudicial effect on them. At Bheemtal, there is an old thannah, which I am informed by Mr. Batten, could be procured for this purpose, and which at a small expense, could be thus converted. After all the leaves in the Almorah and Hawaulbaugh nurseries were manufactured, the Chinamen could then proceed to Bheemtal, and manufacture those procured from the nurseries in that district. During this last season, the leaves procured in the Bheemtal, &c. district, were transported in baskets during the cool of the evening to Hawalbaugh, but still they always arrived in a more or less dried-up state, which proved not only detrimental, according to the Chinamen, to superior tea-making, but also many of the upper leaves were obliged to be separated and destroyed, which, had there been a manufactory in the district, might have been converted into a good marketable tea; moreover, in the space of a few years the Bheemtal district will yield a vast quantity of leaves, the expense of the carriage of which alone to Hawalbaugh would soon cover the present proposed and necessary outlay.

17. *Future prospect of the tea plant cultivation.* The experiment as far as it has been tried, has fully realized

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* See Government letter, No. 1014, dated 9th September, 1843.

the most sanguine expectations. On the authority of the Chamber of Commerce of Calcutta, the tea has been pronounced "a very good marketable article,"* and by Messrs. Thomson and Son of London, † "as fine flavored and strong, and equal to the superior black tea sent as presents, and better for the most part than the China tea imported for mercantile purposes."‡ With statements from such authorities, the experiment may be considered as fully tested, and now steps ought to be taken to bring it to profitable account. There are vast tracts both in the provinces of Kemaon and Gurhwahl, equally well adapted for the growth and culture of the tea plant, as those where it is now thriving. When once Government have sufficient land under cultivation to cover the expense of the outlay, then it would be desirable to induce the natives of the provinces themselves to cultivate the plant, and by them the leaves to be supplied at a certain valuation to the Government manufactories. At present, it must be admitted that in Kemaon the tea experiment is looked upon as a most unprofitable scheme, as there has been a considerable outlay, without any adequate return. From, however, the small quantity of land under cultivation, none could be expected. But the time is now come to consider it no longer in the light of an experiment, and to extend vigorously the culture of the plant, and when it is once proved to the native community that the plant can be cultivated with profit to themselves as well as to Government, then will they pay attention to it; as an example to the point we may mention the potatoe, which a few years ago was unknown in this country, and introduced at first with but little success, and cultivated in small patches. Natives however having seen the advantages to be derived by its cultivation, have now thousands of acres in culture both in the hills and plains. In China, the tea-plant growers are different classes from the tea manufacturers. So in this country the system may be established. The plant is most hardy and does not require much care in cultivation, there is therefore no cause to prevent it producing some day as much effect in the revenue of the state as the poppy. This assertion is not made rashly. I have examined a large portion of the provinces of Kemaon and Gurhwahl. I have there seen large tracts, many of them lying waste, and admirably adapted for the tea plant. The country in many places is no doubt thinly populated, and this is frequently stated as an objection to the extensive cultivation of the tea. It however is a most erroneous one. Let permanent labour be but once ensured, then will there be no want of labourers. Thus for some time much difficulty was experienced at the new settlement of Mynutal in erecting buildings for want of labourers. Coolies however on finding that they could get constant employment there, have now assembled to the number of 400 or 500, and these, too, principally from the province of Gurhwahl. In order, however, that the increase of the nurseries may be adequate with the demand, it would be most desirable to introduce from time to time, tea seeds from China in quantity, and probably the Hong Kong authorities would now find but few obstacles presented in procuring them. I would therefore beg particularly to bring this to the notice of the Honorable the Lieutenant Governor. The Government nurseries now yield a vast quantity of seeds. The plants now amount to 1,50,000, and these will be doubled I trust, or trebled annually; and were there only seeds in sufficient numbers, as they germinate most freely, provided that they are fresh, the aspect of the nurseries in an infinitely short space of time would be changed; for instead of patches, there would soon be districts covered with tea plants. Nor are the other methods of propagating the plants by layers, cuttings, &c. neglected. Every exertion will be made to do so on the most extensive scale, and I trust at the end of the ensuing rains to be able to add a considerable tract in addition to those already mentioned. Nor is the state of the tea plant in Gurhwahl less promising. The nursery at Paoree, established last season, contains about 2500 plants in a thriving condition. The nursery at Koolagir in the Dehra Dhoon, contains about 4500, and here the plant is thriving as well as in any of the other nurseries. I have added two acres to this nursery, and beg to recommend, that another mallie on 5 rupees per mensem be appointed. It is, however, to be proved whether the leaves yielded by the plants in this locality are fitted for making tea of a superior quality, as it has been ascertained that all the tea grown in China at low elevations is of an inferior description. If, however, it does prove to be a marketable article, and equal to that produced in the neighbourhood of Canton, a vast field for enterprise will be opened up, whether Government considered it worthy of their own attention, or it be brought about by private capital. Water carriage will soon, it is hoped, be within two or three marches of this valley, which will also be a strong inducement, in addition to the above, to make capitalists invest their capital in this channel, and thus we trust ere long to see the hill provinces, which at present yield but a trifling sum to the revenues of the state, become as important in an economical point of view, as any of those in the plains of Hindoostan.

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* See Government letter, No. 17, dated 31st May, 1843.

† See Mr. Secretary Hamilton's letter, No. 897, dated 16th August, 1843, with enclosures.

‡ Mr. Commissioner Lushington sent a small quantity of the tea across the British Frontier to the authorities in Thibet; by them it was declared to be of a superior quality, and many enquiries made as to the locality of the plant where the tea was made, &c. and a request, that no more be sent in that direction. Tea is imported packed in skins across the Frontier to Almorah. I have transmitted a packet for the Honorable the Lieutenant Governor's inspection, who probably may consider it worthy of being sent to the Honorable the Court of Directors, in order to be compared with that made in the British province, and to shew how superior the latter is, and how easily it might supplant it in the market. The packet weighing about 5¼ pounds, is sold in the Almorah bazar at 5 Rs.

(Signed) WILLIAM JAMESON,
*Superintendent Botanical Gardens, North-Western Provinces.*

*Office of the Superintendent Botanical Gardens, North-Western Provinces, Saharunpore,* 28*th February*, 1844.

## *Hints on the managment of Tulips, Ranunculuses, Anemones, &c.*

### *By Mr.* H. GROOM.

It having been mentioned to me by Dr. Royle, that a few hints on the management of Florists' flowers would be acceptable, I have enclosed the following remarks on the cultivation of the bulbs sent by me this season.

In giving these directions, it must be borne in mind that I am comparatively unacquainted with the climate and best periods for growing flowers in India, it will therefore be necessary to vary the plan according to circumstances.

TULIPS.—The best soil for these bulbs, is a light sandy loam moderately rich, with rather a low or at all events a level situation, and were there is a moderate quantity of moisture in the soil; and as these plants grow in England during the winter and spring months, I should consider the best period to plant them would be just before the rainy season, in a cool situation, and if possible shaded from the midday sun. The position having been selected, a bed should be formed four feet wide and of sufficient length for the number of bulbs, the soil of which should be taken out 2 feet deep and broken up fine and a little well rotted manure may be mixed with it, turning it two or three times over to expose the whole to the action of the air; the bottom of the bed should also be dug up rough, and about 2 inches of well rotted manure may then be put into the bed and broken in with the soil. After this is completed, the soil which was taken out may be put into the bed and left to settle for a few days, (of course the preparation of the bed should be all completed before the period for planting,) it will also be better to have a sufficient quantity of very light mould mixed with $\frac{1}{3}$ of fine sand, ready for covering the bulbs; if the sand is from the sea shore, or river, where it is likely to be salt, it should be washed, otherwise the salt will kill the plants.

On the day fixed for planting the bulbs, the mould in the bed should be levelled and raked smooth, it will then be necessary to mark the positions for the roots, as they will have to be planted on the surface, and afterwards to be covered with the sandy soil. The best way to mark the positions is to divide the 4 feet bed across at each end into 8 equal parts, by which there will be 7 places for the long rows; if a line is then strained tight on the bed from one end to the other over these places, by springing this line a mark will be made the length of the bed, this repeated to each division, will give the 7 lines, the number of roots to be planted across the bed, the lines crossing these are marked by dividing the bed on each side into intervals of six inches, and then by drawing a line across you have the figure, No. 1, in the plate annexed.

A root is then to be placed where the lines cross each other and when the planting is finished, they are to be covered with the sand and soil 3½ inches deep, and the bed raked level. They do not require any further attention until they have grown 5 or 6 inches above the ground, when they may be watered occasionally if the weather is very dry or they appear to require moisture; when they begin to shew their flowers and get into colour they should be protected from the sun and heat as much as possible, at the same time giving all the light and air that can be managed. In England we shade the tulips when in bloom with canvass on a large frame called a tulip stage; mine is 14 feet wide 150 feet long 7 feet 6 inches high to the top of the posts, and 12 feet 6 inches to the under edge of the ridge board, giving the figure No. 2.

The cloths which cover the top are made so that they can be drawn up when the sun is not shining, and at night to give air which is necessary to keep the plants from drooping. I should think for India if the sides were made of wire work or some good conducting material (coarsely perforated zinc would do) with iron supports here and there driven into the ground, it would allow the air to pass through it and at the same time the air would be deprived of a considerable portion of its heat by the metal which would convey it into the earth.

I think the same plan might be desirable to cool your dwellings in hot weather, particularly if there was an external frame on which coarse cloth was strained and the cloth kept constantly wet, and if the Cholera is produced by currents of electricity, I am of opinion that the air passing through this medium would be deprived by the metal of the excess of electricity and thereby rendered innoxious: it might be worth a trial. When the tulips are out of flower the whole of the shading should be removed that the plants may receive the full benefit of the weather. In England when the stems are decayed we take up the bulbs, and I should think the same plan would be desirable in India, but when the bulbs are taken up they should be kept cool and not too dry, until the period best suited for planting them again.

HYACINTHS will require to be planted at the same time as the tulips, and the bed should be made much the same as for that flower, but the soil should be more sandy, and they require to be covered 4 inches deep, also to give them a greater distance from each other—six roots across the bed will be sufficient and about 8 inches from row to row in the length of the bed; it is a plant which requires considerable moisture during its growth, even more than the tulips. In a climate like India it will be desirable to shade them when in blossom to preserve the flowers, (which I should recommend to be done with all Florists' flowers,) although it may not be necessary to have so large a stage for them as for tulips. They should be taken up when the foliage is decayed and treated like the tulips.

RANUNCULUSES and ANEMONES should have the beds prepared in the same manner as for the tulips, and be planted at the same season; the soil should not be so sandy, but much richer; they should also be in a damp cool situation, as they require to be kept moist during their growth, otherwise they produce flowers sparingly, and of a small size. The ranunculuses should be covered about 1 inch and the anemones 2

Fig. 1

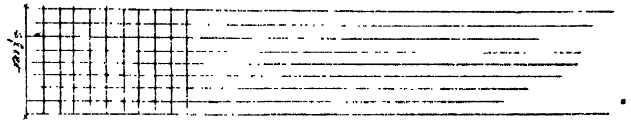
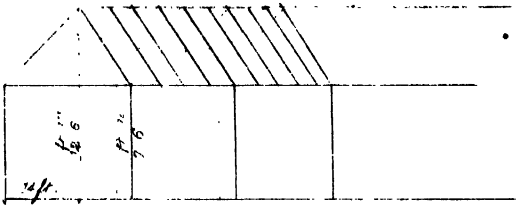


Fig. 2



inches deep, they can also be planted closer than the tulips; the shading can be adopted when in bloom if thought desirable. When the foliage is brown the roots should be taken up and dried gradually; they must be kept in a dry situation until the time for replanting them.

**English** and **Spanish Iris** require much the same soil and situation as tulips; they can be planted about 3 inches deep; it will not be necessary to take them up annually, neither do they want to be shaded.

**Crocuses** will grow in any soil, but prefer a sandy mould; they should be planted deep, say 5 to 6 inches, as I have seen the finest flowers from deep planted roots; they do not want removal.

*Clapham Rise, near London,* 26*th October*, 1843.

## *Memorandum on the Manufacture, &c. of Black Tea, as practised in Assam. By* JOHN OWEN, *Esq.*

*To the Secretary of the Agricultural Society.*

DEAR SIR,—With reference to the recommendation of Mr. Charles Terry in his report on Mr. Sconce's sample of Chittagong Tea, (published in the 9th No. of the Society's Journal,) to the effect that it would be desirable that parties interested in the cultivation of this plant at Chittagong should have some particular account of the process adopted in Assam by the Muttock Tea Company, I have the pleasure, with a view to assist in carrying out this recommendation, to submit the accompanying notes, in the hope that the hints contained therein may prove acceptable to the Society, and useful to tea cultivators in general.

I am, &c.

(signed.) JOHN OWEN.

*Calcutta,* 11*th March*, 1844.

I have for the last three seasons commenced picking my leaves from the 1st to the 8th and 9th of April, and I should be disposed to think that this might be done in most factories where a few days rain had fallen towards the end of March, followed up by a hot sun, for I have found in some plantations where the forest has been only partially cleared, and the shrubs consequently protected from the sun, that the young leaves come out very languidly, and are necessarily more thick and brittle, than in those gardens where the plants are more exposed. Night dews are very acceptable during the manufacturing season, and by most planters are much courted.

The best localities for *sown* plantations is undoubtedly on the slopes of hills, without reference to magnetic directions, or on irregular undulating lands. Spots of Indigenous Tea have been found on the plains, but the plants do not thrive so well.

In manufacturing I would recommend great care to be bestowed on the *building* of the Tea house, (a sketch of a proper one accompanies this.) *Light* is indispensably necessary for watching the growing and fading colours of the Teas, while being fired. *Room* for working is equally desirable, that your men may play freely, as quickness is so requisite in some parts of the process, that its absence is frequently the means of spoiling whole baskets full of the raw produce.

Though windows in the day time are so much wanted, yet, good shutters for keeping out the damp night air from the Teas must be had, or it may be necessary to give them another firing, which any thing but improves the quality.

In large factories, discipline, to command economy, is a grand thing to be attended to.

When each artizan has his own particular station in the Tea house, and is not allowed to move from it either to assist another, or leave the place altogethor, it is astonishing what a quantity of extra work may be accomplished, and in the first and second crops it often happens that the young leaves grow so fast that many of the manufacturers are required out to assist in the plantations by day, leaving work in the Tea house till midnight. This system I should be inclined to deprecate, however, where *it is not actually necessary*, and only to save the leaves from entire loss, as the smoke from the different lamps required to light up the place must, however imperceptible when new, throw a foreign flavor, deteriorating from the aroma of such a delicate leaf as the Tea.

I need hardly observe that *cleanliness* should be carefully attended to by the planter both in his rolling tables and the hands of the Artizans; for not having possibly any sensible effect on the leaves, still every delicately minded man would wish others to eat or drink as pure an article as himself, and it is difficult to impress on the mind of Natives the necessity of those frequent ablutions which are called for before commencing this operation.

In a certain part of the process the leaves are rolled on large bamboo mat baskets, about 3 feet in diameter, with a rim of 2 or 3 inches all round it. The strictest attention should be paid to the making of these baskets, so that in the motion of rolling the leaves on it, they would not be *cut* by the harsh edges of the bamboo which is very often the case, as may be observed by any person on saturating a few leaves of any kind of black tea. These baskets should also be well seasoned before use by keeping them 6 or 7 days under water, otherwise the planter is as liable to injure the *Aroma* as well as the *appearance* of his Tea.

The *charcoal* used should be of the finest description, and requires almost as much care in selection as the Tea leaves themselves. I would myself recommend close-grained woods destitute of gum, and this should be burned under ground, in the Chinese manner; the moment a piece of charcoal is detected *smoking*, it should be removed, otherwise the Tea over it will be spoiled.

The process of *rolling* is perhaps the most difficult to learn, and it requires daily practice of some months to acquire a proper habit of it. It is effected by taking as many loose leaves from the tray or basket as can conveniently be compressed between both hands; then gradually roll these backwards and forwards until they form like a ball; they must be kept united, or they do not uniformly partake of the roll or twist which so prominently distinguishes the *better* Teas; although it is difficult at first to keep them united, a little perseverance with a determination to accomplish the task, will soon enable the tyro to overcome all difficulties. It should however be understood that the *twist* is what is required, the necessary peculiar volution of the hand therefore will be readily understood.

I would, from experience, here suggest to the planter, that in the periods of gathering, his pickers be divided, according to the number he may have and the size of his plantation. For instance, instead of picking the leaves of all sizes promiscuously and throwing them into one basket, post off your men; if there are 50 engaged for the work, supposing you may desire four sorts of Tea, order twelve (marked No. 1,) to bring in Pekoe leaves, twelve more (marked No. 2,) for Souchong, twelve more (No. 3,) for Congou, and the remainder (No. 4,) for Bohea, if this latter be wanted, though this class of leaf by the bye in Assam is not so easy to manufacture into any thing saleable on account of the enormous size of the leaf.

After a picking, to give vigour to the plant for its next supply of leaves, it becomes necessary to look carefully to its roots. My own practice has been strictly to watch the trees and assist their subsequent produce by not only thorough weeding, but by a gentle hoeing near the roots, and earth thrown up afterwards round the root to the height of some 7 or 8 inches. To secure a good crop as well as good produce, I would recommend that the plants (if an artificial plantation) be not sown too near to one another. Where Tea is indigenously found, ground is generally, I think, not much in request. One of the Government plantations in Assam, *Chubwa*, is a proof of this assertion, the young suckers and plants not having been removed from around the parent stems, the soil had become exhausted, and but few leaves are obtainable from these. *Pruning* too is absolutely necessary to check the plant, naturally wild, from shooting up beyond picking height, but the most proper time for this I am myself not competent to judge of, although very desirable that it should be ascertained. It is more than probable too that the operation known in Horticulture as *stopping*, would be a preferable method of obtaining this object.

In sowing, where you have an abundant supply of seed, I would recommend from two to three to be put 3 or 4 inches deep in each hole, at distances of six feet from one another, and at each of these places any particular mark, such as an arrow or piece of stick, should be placed, as in weeding the young plants might stand a chance of being rooted up. This way of planting I have found to be more profitable and to yield ultimately finer trees than those educated in a nursery close together, and afterwards transplanted, for the spiral root, when taken up even carefully, is slightly damaged, and stunts, if not altogether kills the plant.

When the shrubs arrive to the height of three feet they should be topped down to force the stem in throwing out branches laterally and thereby form a bush. Should more than one of the three come up, I would recommend the weaker plants being thrown away. A few days prior to the young leaves appearing on the trees, that is about March, it is advisable to pluck and throw away *all* the old leaves that may be on, taking care that they *are not torn off*, because if this be done the young leaf between the stem and the old leaf may be carried away, and thus harm done by loss of produce. All leaves taken from the plants should be *plucked off* with the thumb and fore finger, leaving the stalk with a small portion of the leaf attached to it.

After the foregoing data, in which perhaps observations may appear, likely to prove of benefit to the planter, I will proceed to notice the different instruments used in the Tea house.

### *Instruments.*

*Pans,*—(*Koras,*) diameter about 2 feet, and depth 10 inches, with round rims.

*Tables for rolling.*—The best are 4 feet in breadth, with proportionate length to the size of the plantation, and with reference to height as conveniently for rolling as the size of the people in the province will admit.

*Dollahs,*—or rounded flat mats for rolling the Tea on also, (or those before spoken of) as being 3 feet in diameter with a 2 or 3 inch rim all round.

*Challonees,* for drying the leaves out in the sun. They are of 2 shapes, one the size of the Dollah, the other nearly double. In kind it is more of a sieve than the Dollah, which is mat work, or bamboos laid close together. In the *Challonee* each bamboo should be half an inch in breadth, leaving another half inch open (sieve like) and so on alternately.

*The Hadjee,* also of bamboo *mat* work, in shape resembling a common *Morah,* without a top, and all the inside of it papered. A convenient sized one should be about 3½ feet high, 2 feet at the extremities, tapering inwards towards the centre, at which place it is about 1½ feet, so as to receive another small sieve.

*A small sieve,* to fit in the centre of the Hadjee, which holds the Tea whilst drying over the charcoal fire.

*Flue,* a small bamboo one which stands erect in the centre of the *small sieve* in the *Hadjee,* round which the Tea is packed. ***Poker***, ***Tongs***, ***and Shovel*** for stirring up the fire in the furnaces.

***Baskets***, of depth for bringing in the leaves, with a piece of rattan attached for the purpose of slinging it round the neck, that the pickers may command both hands.

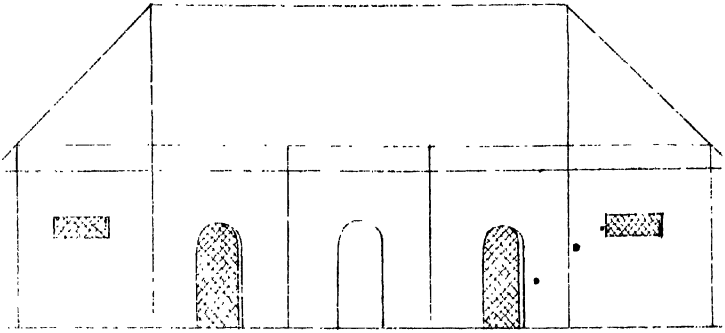
***Choolas***, or a row of mud recesses for the reception of charcoal, over which the ***Hadjees*** are placed to dry the Tea.

### *Manufacture.*

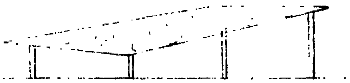
In picking, the three or four end leaves may be plucked off ***with the stalk altogether***, the remaining under ones nipped off at the end ***leaving the stalk*** on the tree, the former are usually manufactured into Pekoe and Souchong, and the latter into Congou and Bohea. On their being brought in by the pickers to the Tea house (if a sunny day) they should be lightly scattered over the ***challonees***, and these latter be placed out in the sun on a ***Machan***, or bamboo frame work, which whether for real use or merely ***Deknee-ka-wastee***, I don't know, but it is generally built diagonally.

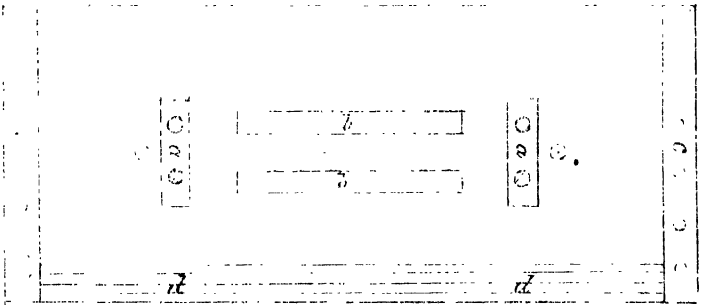
When the stalks of the younger leaves appear faded, are perfectly supple, and will bend round, it is time to take them back into the Tea house, where they are placed on gratings built on purpose, until they get perfectly cool. They are then brought down, placed on the table and beaten, or rather tossed up between the arms and hands until the serrated ***edges*** of the leaves have assumed a reddish hue. Put them again in the sun on the ***Machan*** for a short time, and when wearing an increased withered appearance repeat the former operation, that of cooling and beating. They are now fit for the pan. Prepare your furnaces, (***with wood*** not charcoal) wash your Pans well, throw in your leaves, when moderately heated, turning them continually over with your hands or two pieces of wood, taking care to give all as nearly as possible an uniform gradual heat; when no longer bearable to the hand, throw them suddenly out into a *Dollah*, which must be ready to receive them, in the hands of one of your artizans, (stationed there for the purpose;) place this on the table, and while hot allow your rollers to take each a handful, and endeavour to give by this operation to the leaf as perceptibly permanent a twist as you possibly can. (Ten minutes rolling for young leaves will suffice. The tougher ones proportionately require more.) Now scatter as gently as possible, these lumps out on *Dollahs*, until the leaves separate without injury to the twist; let them cool, and when perfectly so, introduce them again to the pan to go through a second firing. Roll again on the table, scatter *more* gently out on the *Dollahs*, and lay them by on the grating till cool. Then light your *choolahs* with charcoal, taking care that no smoke arises from it, and lay thinly on the *small sieves* the leaves which now begin to wear the appearance of Tea inside and at the centre of the Hadjee; when found to be dry and crisp take them off the fire and lay them by on *Dollahs* and on the gratings. This is considered all of the first day's work. In the morning divide your men, half to repeat the foregoing process as directed, and the other half to go on finishing the former day's as I will now direct.

The fried leaves, it will be recollected, were laid by in *Dollahs* on the grating in the Tea house. Turn the hands out at daylight, and giving a Dollahful to a couple of men, let them pick out and separate all those of corresponding sizes, when this is done light your *choolahs* again. Place your *Hadjees*, with the *little sieves* over them. Place also the *Flue* upright on the centre of the *little sieve*, pack the partially manufactured leaves of yesterday all round it up to the top of the Hadjee, and allow it to remain over the fire (without the instrument receiving even a single shake) until the leaves gather a sufficient crispness and uniformity of color, by the heat; over slow fires they are sometimes allowed to remain all night, but a practised eye, and attentive



Elevation.
Scale 10 feet 1 Inch.

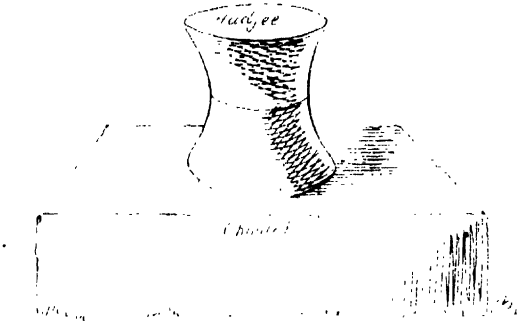


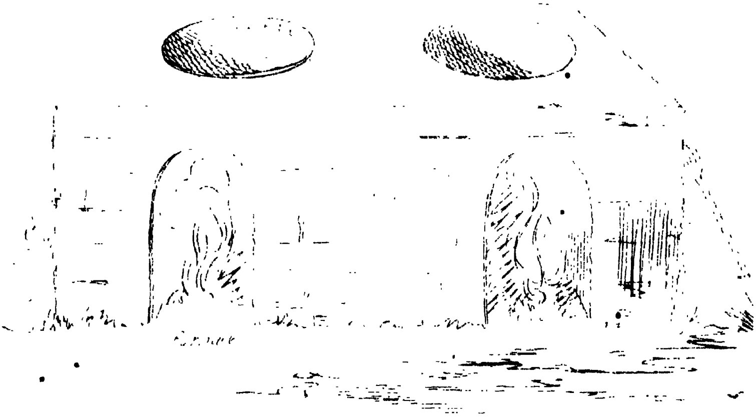


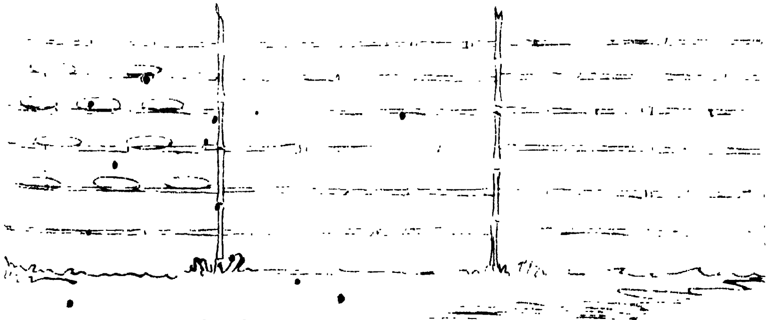
Ground Plan.

## References.

| | |
|---|---|
| a.a. | Tea pans. |
| b.b. | Rolling tables. |
| c.c. | Choolas. |
| d.d. | Dollah Racks. |







Sketch of the Rack to put the Dekchis on, made out of [illegible] Bamboos

watching, can alone determine the precise time of its finish. One circumstance I must not omit, it being one of serious loss if neglected,—the necessity of not even touching the *Hadjee* while with Tea in it over the fire, lest even one leaf should fall through the sieve and be burned, causing smoke, which would of course spoil the whole. When this is cool, pack into your boxes, taking care to press the tea down with both feet and hands. Tea in a box when opened ought to be so well packed as to entirely resist the arm when introduced into it.

An account of the process of green tea manufacture shall hereafter be forwarded.

## *A few brief Notes on the Cultivation of Sugar Cane in Bengal. By* S. H. Robinson, *Esq.*

Having been long impressed with the idea that the Sugar Cane of Bengal owes its inferiority to that of the West Indies at least as much to the defective cultivation afforded to it as to the less favorable condition of soil and climate it experiences, I made last year some experiments on a small scale, with the view of testing the truth of this opinion. The most remarkable difference in the cultivation here and in the West Indies appears to be in the time occupied in the growth of the canes:—from 12 to 15 months being the general period occupied by that of the latter, whereas the common Bengal practice of planting after the middle of April and cutting in the following January or February allows at the utmost 9 to 10 months for the maturing of the plant:—the conclusion naturally arising from which is, that the cane during this short and quick vegetation has not the time to imbibe the strength, size, and richness of its transatlantic competitor.

I accordingly planted in the same field cuttings of the Native yellow Cane (the Poree kind,) on three several dates, viz. on the 6th February, the 5th May and the 20th May, carefully measuring the ground occupied by each. No extraordinary care was bestowed on the cultivation, the ground having been prepared with the common Native plough, and manured with cow dung and some earth from the bottom of a dry tank, as customary in this district, (Burdwan.) The only extra attention required by and afforded to the February plants being the additional weedings and waterings required during the dry months.

The results will perhaps be more clearly explained by the following form, where the circumstances of the three experiments are noted down in juxtaposition.

| No Exp | Date n p | Sq fee up e | Rough meas reme of ground n Co tahs. | Numbe ngs | Numbe ngs | Da ng | wh | Weight of cleaned cane in B. Mds. | | Average produce in B. Md's. per Beegah. |
|---|---|---|---|---|---|---|---|---|---|---|
| No. 1 | Feby. 6th | 1650 | $2\frac{1}{4}$ | 3 | 7 | July, 6th | Jan. 25 | 26 | 13 | 234 |
| No. 2 | May. 5th | 5500 | $7\frac{5}{8}$ | 2 | 3 | Sept. 15th | Ditto, | 50 | 37 | $133\frac{1}{3}$ |
| No. 3 | May. 20 | 2970 | $4\frac{1}{8}$ | 2 | 3 | Ditto, | Ditto, | 26 | 9 | $123\frac{2}{5}$ |

From several trials made by weighing the canes and measuring the fields from which they were produced by Native cultivators in this neighbourhood, I have ascertained that a good average produce is about 150 B.Mds of cleaned cane per Beegah: the above experiments, Nos. 2 and 3, therefore appear to have been rather unfavorable in their results; but as the cane of No. 1 experiment was planted on the same field, and tended under exactly similar circumstances, save and except as to its priority in time and the extra weeding and watering, it is fair to consider that the produce of the latter also may be rather below than above what it ought to have been, and in like proportion.

Taking therefore the three experiments as they stand, and valuing the canes at Co's. Rs. 16 per 100 B. Mds, (a fair average rate) we have, on a rough calculation, Co's. Rs. 35:8 per B$^{h}$. as the value of produce by experiment No. 1;—Co's. Rs. 21 : 8 for that of experiment No. 2;—and Co's. Rs. 20 for experiment No. 3;—or taking the average of the two last, about Co's. Rs. 14/12 per Beegah in favor of the February planting.

It should be mentioned that some seasonable showers in February and March last year were in favor of the early plants; and perhaps, as such could not generally be reckoned on, six extra waterings instead of four, the number required as above, should be accounted as requisite on the average of seasons; and allowing each watering to cost at the high rate of one rupee even, and extra weeding 12 annas per Beegah, we should still have 8 Rs. per Beegah clear gain by the method of planting in February.

In the foregoing remarks the superior *quality* of the earlier planted Cane has not been noticed: unfortunately the quantity was too small to allow an examination of the juice produced from each crop; but from the appearance of the plants the presumption is greatly in favor of a far finer produce being obtainable from the February cultivation, the canes of the latter being larger both in length and diameter, and the difference of their aspect from the May plants standing next to them, was very remarkable throughout the whole time of their growth, and shewing when ripe an average height of at least 18 inches above the May crops.

The experiments altogether may perhaps be considered on too small a scale to warrant any accurate inferences being drawn therefrom: but though perhaps requiring further and larger experiment to confirm the results satisfactorily, the facts attained are sufficient to convince me of the great advantage to be gained by the earlier planting where the means of irrigation are within reach, and I am therefore induced to offer my notes, such as they are, to the Society.

I may also notice that a small plot of Otaheite Canes planted at the same time, with exactly similar treatment, and in the same field with the Native cane of experiment No. 1, suffered so much from the white ants that about one-third only of them survived, and therefore no satisfactory deduction as to their produce was, or could be, attempted. Mr. Wray in one of his papers in the Society's Journal mentions a similar remarkable partiality of the white ants to Otaheite cane in his plantation in the Goruckpore District, but for which he does not attempt to account.

I am this year making trial of the China Canes, and as I hope for better success with them, I shall perhaps be able to offer some further remarks on this subject by and bye.

## *On the best mode of propagating plants in India. By Mr.* ROBERT ROSS, *Head Gardener, H. C. Botanic Garden, Calcutta.*

*To* JAMES HUME, *Esq. Honorary Secretary of the Horticultural Society of India.*

1. SIR,—Having been requested by Mr. Blechynden to draw up some practical memoranda on Horticulture, suggested by my experience as a gardener in a tropical country, I have the pleasure of submitting to you the following remarks on cuttings :—

2. At present nothing appears to me so necessary to be generally known as the propagation of the many choice plants annually given away from this liberally supported establishment, more particularly as the present Superintendent, Dr. Griffith, intends giving none away, but really choice plants, whether indigenous or exotic; such an arrangement, I have no doubt will give satisfaction to all who may apply for plants.

3. Many parties have an annual supply. This I believe would not be the case generally, if the applicants knew how easily they might increase many plants: I chiefly refer to

families who keep one, or more *mallees.* It is well known that native gardeners have a very rough idea of gardening, but if their employers knew how to point out what ought to be done in the flower garden, and in the propagation of plants, they might improve, and ultimately become a more useful class in India.

4. I beg to point out in the first place, the sort of bed necessary for the propagation of plants from cuttings in this climate, and then the mode of treatment to be attended to. An open space of ground is to be selected, free from shade, (or what is more injurious to cuttings, the drip of trees in the rainy season,) where a bed of brick and mortar is to be made; the foundation need not be more than three or four inches below the surface; the walls need only be one brick thick, and about two feet high, three feet wide in the clear, and of any length, according to circumstances, or the number of plants to be propagated. One thousand plants or more, under a careful hand, can be produced from a bed, three feet wide in the clear and six feet long, in one year. When the bed is ready for filling with mould, &c., about eight inches of broken flower pots, bricks, or any thing else that will answer for good drainage, is to be placed at the bottom, on the top of this four or five inches of common mould, the bed is then to be filled up with sand, the finer the better, as coarse sand will not answer so well; a bed thus made, is ready for all the purposes intended. The next things required, are bell glasses and mats to cover and shade the cuttings in the bed after planting. The object of thus covering the cuttings with glass is to prevent evaporation; this is done by pressing the glasses firmly down on the sand bed over as many cuttings as the glasses will hold. If bell glasses cannot be had, common hanging lamps will answer the same purpose, and indeed, are much better for large cuttings 12 or 18 inches in length.

5. The distance at which the cuttings should be placed under the glasses must depend on the size of the foliage;

for small cuttings with small leaves, two inches will be found enough, and so in proportion. Small cuttings, those for instance 4 or 6 inches long, will require to be planted about 1½ inch deep and firmly pressed in the sand: when all are planted, they are to be watered, the glass placed over them, and shaded from the sun, from 8 in the morning to 5 o'clock in the evening, sooner or later according to the season of the year; the glasses need not be taken off more than once or twice weekly to give a little water and keep the cuttings clear of any decayed leaves, &c. &c.

6. What I mean by cuttings is not simply cutting a shoot or a branch into so many pieces and sticking them in the ground; this will answer for some soft-wooded sorts, but not for hard-wooded plants. For preparing cuttings of the more difficult hard-wooded plants, the young shoots, when long enough, say 6 or 8 inches more or less, are to be cut off with a portion of the former season's growth.

I here refer to plants requiring a previous preparation, say one or two months before suitable cuttings can be had; many plants throw out long straggling shoots, such for instance as the following:—

Buginvillea spectabilis,
Bignonia equinoctialis,
Banisteria periplocifolia,

and others of similar habits. One or more of such shoots should be stopped, by cutting away the top of the shoot; this stopping will cause each shoot so treated to throw out laterals; when these lateral shoots are long enough, as referred to above, they should be taken off with a portion of the shoot that was previously stopped in its growth, the leaves cut away as far up as the cuttings are to be placed in the ground, all the rest are to remain; it is immaterial what length cuttings so prepared may be, provided glasses can be had high enough to receive them. Ordinary bell glasses will not receive a cutting more than 6 or 8 inches in length; but if large hanging lamps are used, then the cuttings may be made 12 or 18 inches in length. Relative to the plants more easily propagated, such as

Poinsettia pulcherrima,
Abutilon striatum,
Orthostemma roseum, &c.

it is immaterial of what moderate length the cuttings may be, or what the number of eyes. I have it is true named above the length cuttings should be made, but I have done so simply to accommodate the cuttings to ordinary sized bell glasses. None of the bell glasses we have in this garden, and I believe we have some of the largest to be found either here or in England, will receive a cutting more than 6 or 8 inches in length, but if large lamps are to be used, then the cuttings can be lengthened accordingly, and will throw out roots as freely as smaller cuttings. We shall suppose that a person has a choice individual plant (say Poinsettia pulcherrima) of which he wishes to make as many as he can, and has only one shoot, and consequently but one bloom, (this plant throws out lateral flowers along the sides of the shoots, but these are never so fine as those produced on the top of each shoot.) After the flowering season, cut the shoot down to 4 or 5 eyes, from each of the eyes thus left on the old plant a shoot is expected to spring, and consequently a bloom, so where you have but one on the plant this season, next season you will have four or five, and by an annual pruning in this way until the plant has formed a proper head, you will have an increase of bloom every year; if the plant is left without pruning it will form a straggling, unsightly head. I have above supposed one of these plants to have but one shoot; to make the most of this shoot, cut it in lengths of 2 eyes each, one eye is meant to form the root end of the plant, and the other the head; from such a plant only one good bloom will be produced the first season; if three or four are to be expected from a plant the first season, then the cuttings must be cut in lengths of 5 or 6 eyes; from such a cutting three or four blooms may be expected the first year. We allow all the leaves to remain on the cutting only on the root end; we trim off as far up as the cuttings are meant to be placed in the ground, deciduous plants excepted. The best season to put down cuttings of such, is after they have shed their leaves, but they may also be propagated at any season, in this climate. It may be necessary here to say, if what is stated in this paper is not strictly attended to, parties making a trial will not succeed; I mean relative to the glasses being firmly pressed down over the cuttings to prevent evaporation and shading from the sun; the mats will also require to be fastened over the glasses in windy weather; if this precaution is not used, the cultivator may lose all his plants in a short time. Shortly after I came to this garden, I succeeded in raising a glass-full of cuttings of Olea fragrans, but through the negligence of the *mallee* in charge in allowing the mats to be blown off in a sudden gust of wind, I lost the whole of them in about half an hour; they were literally roasted, not a spark of life was left in one of them, and this after six months' care and attention was very trying; such will be the case if care is not taken.

7. The proper season to multiply plants from cuttings in this climate is during the rains, when the ground is like a moist hot-bed; it is true cuttings will root here at all seasons with proper care and attention, but that care cannot be bestowed by all, therefore I recommend the rains as the best season, for then little care is wanted beyond shading the cuttings from the heavy rains, and the occasionally burning sun; indeed I may add, there are some of the hard-wooded plants it would be useless to attempt to propagate from cuttings, except in the rainy and cold season. The number of this class is, however, but few, compared with what may be propagated at all seasons.

8. The length of time the cuttings will require to be in the bed before they will have roots enough to admit of their being potted off, depends on the sorts; the free-growing sorts will require about one month, and hard-wood-

ed, about six months; generally speaking, if they are not found to root or shew signs of rooting within this time, there is little chance of such being raised from cuttings. The Olea fragrans takes about six months, but if this plant is raised from layers, it will take 18 months or 2 years before a well-rooted plant is produced. I refer to the Indian mode of layering such plants in small pots, but if the layers were placed in the ground, instead of pots, they would root much sooner; but when one can raise 40 or 50 plants of this species under an ordinary hand glass in 5 or 6 months, it is useless to trouble oneself with layers, gootys, or grafts.

9. The reason why I recommend sand beds for cuttings, as referred to above, is this, the cuttings cannot at any time be over-watered, the sand will hold no more water than is sufficient to keep the cuttings moderately moist; if they should at any time get an over-supply of water, it escapes as fast as it falls through the drainage below; a moist friable soil is essentially necessary to excite roots; common mould by constant watering becomes hard, the surface alone is watered, consequently that part of the plant that wants most moisture gets none, or at least very little, unless there is such an abundant supply of water poured on, as to make the surface of the consistence of fresh mortar, and this under a tropical sun where the ground dries so soon and cracks so freely, would not answer.

10. When the cuttings have roots enough, they are to be potted off early in the morning, or late in the evening; after potting, water freely to settle the mould about the roots, shade them for a few days until they recover the shift, afterwards expose them gradually to the sun. Do not plant them deeper in the pots than they were in the bed, and be careful not to injure any of the roots by pressing the mould round them in the act of potting; indeed for delicate roots, it will be found best not to press the mould in the pots, but let it settle of itself by means of a good watering.

It is a common custom with *malees*, in potting plants, (unless they are watched,) to place the roots on the bottom of the pots, and press the mould around the roots as firm as they can; by this means the roots are covered too deep, and with an ordinary watering in the dry season they never get the least moisture, death or sickliness is the consequence.

11. The compost the major part of flowering shrubs, &c. will be found to thrive in, consists of one-fourth well rotted cow-manure, one-fourth vegetable deposit, one-fourth river sand, and one-fourth common mould well incorporated; if only fresh cow-manure is procurable, it is to be placed in any out-of-the-way corner, and covered over with about one foot of common mould, and there allowed to remain for about sixteen months, when it will generally be found fit for use. If vegetable deposit is not at hand, collect all the leaves available, throw them into a shallow tank or hole; good vegetable mould will be found in it in about twelve or eighteen months; but if the leaves are thrown into a deep tank full of water, those only between what is usually called wind and water, will rot in about twelve or eighteen months. Provided they are kept moderately moist, leaves will generally be found to have enough within themselves to excite fermentation. I believe I may say Teak leaves excepted; at present I know of none else. If leaves are thrown into a tank full of water, they will turn black and not rot so soon.

12. The free growing sorts root so soon after planting, it is scarcely necessary to say any thing about them; they form a head rapidly, and this they would not do if they were not sufficiently rooted to pot off, so the cultivator is not long kept in suspense. In the rainy season, many of the species will be fit to pot off in three weeks after the cuttings have been planted under the glasses; if in about one month after the cuttings of the more difficult sorts have been planted under the glasses, the leaves keep green and fresh (many species shed their leaves, but one is not to suppose because this is the

case the cuttings are likely to die, but on the contrary,) the eyes begin to swell, and the bark appears plump, not shrivelled, the cuttings are likely to root: again, if there is no visible change in the cuttings to lead one to suppose roots are forming, or have formed, take one of the cuttings carefully up, and if a ring of granulated matter is observable, cuttings in such a state will be sure to throw out roots very soon, but many plants which are difficult to root, as orange trees, oleas, (the olive,) camellias, heaths, &c. will be found in the first instance, and for some considerable time after propagation, to throw out roots only from the granulated ring, or ring of herbaceous matter, above-mentioned; and to facilitate the formation of this ring by properly preparing the cuttings of the most common plants, is, or must be, a great advantage. I am well aware it is a common practice with many gardeners at home to cut off the whole, or part, of the leaves of cuttings, which I have found in India always attended with bad effects. With evergreens, I believe the leaves of such plants or cuttings supply nourishment to the cuttings till they can sustain themselves; indeed I know from experience, this is the case. As I have observed above, it is necessary to trim off all the leaves as far up as the cutting is meant to be placed in the ground, but let all the others remain entire, if the plant is not deciduous.

The preparation of a cutting of any plant depends on, or is guided by, this principle—that the power of protruding buds or roots resides chiefly, and will be found in most cases entirely, at what are called joints, or at those parts where leaves or buds already exist; hence it is, that cuttings ought always to be cut across with the smoothest section possible, at an eye or joint, and as buds are in a more advanced state in wood somewhat ripened or fully formed, than in wood in a state of formation, this section should be made in the wood of the growth of the preceding season, (see Sketches,) or, as it were, in the point between the two growths. It is true, that there are many sorts of cuttings which throw out roots not only from the ring of herbaceous matter referred to above, but also from the sides of every part of the stem inserted in the soil, whether old and large, or young and small, such as willows, currants, vines, gooseberries, &c.

13. The following is a list of some of the plants considered by many hard to multiply from cuttings :—

Magnolia fuscata,
——— pumila,
——— pterocarpa,
Lagerstromia elegans,
——— grandiflora, and all the other sorts.
Oranges and Limes, all the sorts,
Olea fragrans,
Chiococca racemosa,
Ixora acuminata,
—— lanceolaria,
—— blanda, Ker, (I. alba, R.)
—— Bandhuca,
—— coccinea, and all the rest of the species,
Bignonia equinoctialis,
——— suaveolens,
——— amœna, &c. &c.
Astrapæa Wallichii,
Dombeya acutangula,
——— palmata, &c. &c.

It is needless to enlarge this list, enough has been named to give the reader an idea of the sorts requiring similar treatment under glass.

14. In the rainy season a flower garden may be successfully planted with handsome flowering shrubs, by planting branches in the beds or borders where the plants are meant to stand, instead of rooted plants; they will soon become large and flower freely, and parties may increase single plants they may possess to any extent, without much trouble, care, or expense. Subjoined is a list of plants that will answer for this mode of propagation; such need not

be covered with glass, or shaded, if they are put down in the rains :—

Petalidium bignoniaceum,
Strobilanthes scabra,
———— callosa,
———— elegans,
Goldfussia anisophylla,
——— isophylla,
Barleria cærulea,
——— prionites,
——— cristata,
——— dichotoma,
Asystasia coromandeliana,
Phlogacanthus thyrsiflorus,
———— curviflorus,
Poinsettia pulcherrima,
Salvia splendens,
——— coccinea,
Russelia juncea,
——— floribunda,
Hamelia patens,
——— ventricosa,
——— chrysantha,
Passiflora kermesina,
———— quadrangularis,
———— lunata,
———— Mayana,
———— laurifolia, and all the others known to me except racemosa,
Malvaviscus arboreus,
Abutilon striatum. To preserve this plant in health, it will be necessary to put fresh cuttings down every year, and throw away the old, as they become unsightly, if not pruned judiciously,
Lawsonia inermis,

Many of the above produce seed annually, but large cuttings will flower much sooner than seedlings.

I am, Sir,
Your most obedient servant,
ROBERT ROSS,
*Head Gardener.*

*Honorable Company's Botanic Garden, April,* 1844.

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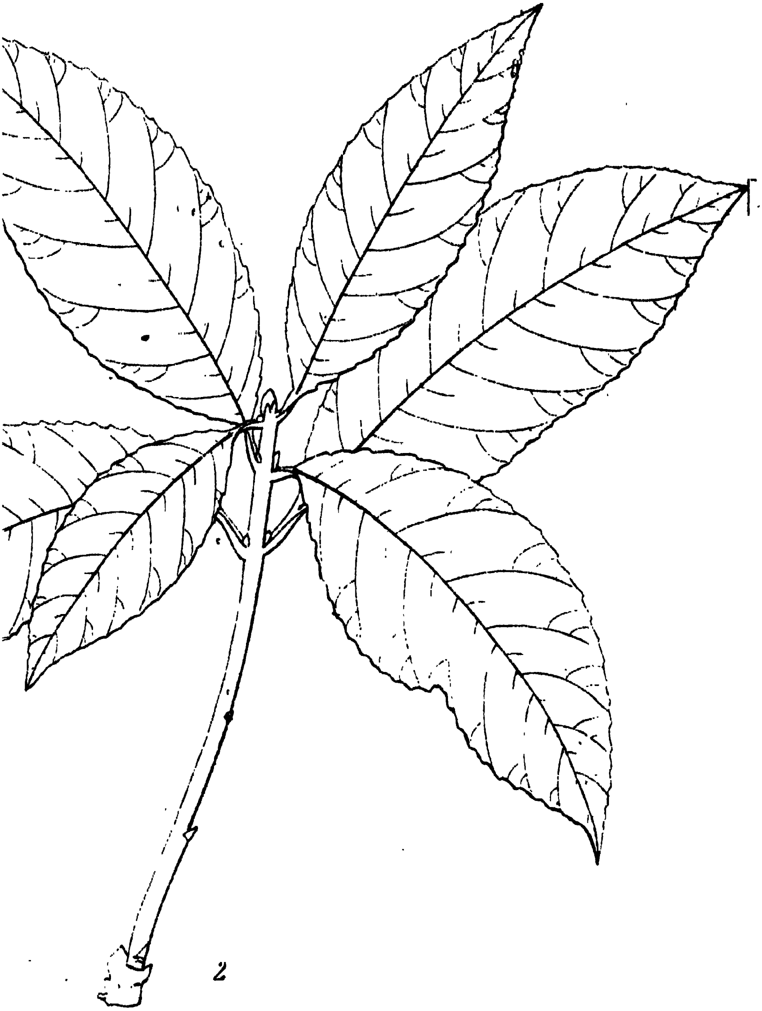
*Reference to the Sketches.*

No. 1. Represents a cutting, or the whole of a lateral shoot of Buginvillea spectabilis, taken off with a portion of the shoot from which it sprung.

No. 2. Represents a cutting of Olea fragrans, of this season's growth, taken off with a portion of the preceding season's growth.

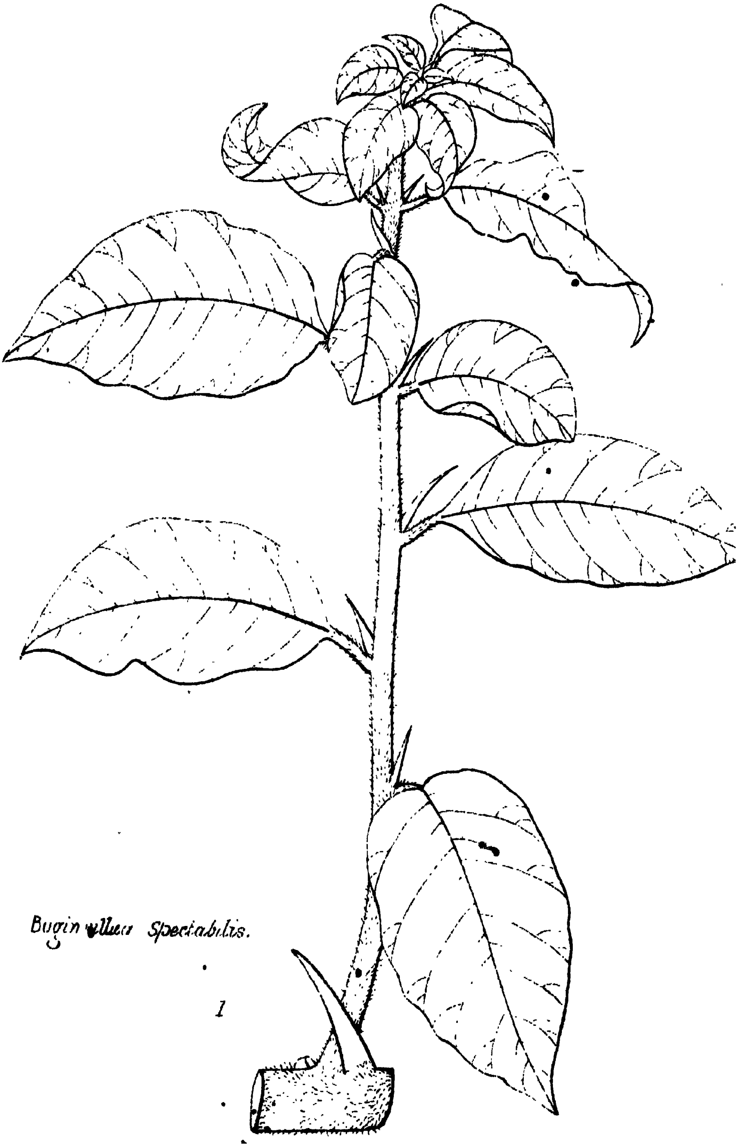
N. 3. Represents a cutting of Poinsettia pulcherrima, but as this plant is so easily propagated, and will throw out roots from every eye or joint in every shoot of ripened wood, it is not necessary to say more than simply cut the shoot, or shoots, into lengths of 2, 4, 6, 8, or 10 eyes or joints each, according to the number meant to be propagated, and plant them in the ground where they are meant to stand, if such should be the wish of the propagator if not; plant them singly in pots, and when rooted they can be turned out and planted with the ball of earth entire without disturbing the roots, but if more than one cutting is put in a pot until they have rooted, and then shifted into separate pots, they will suffer by such treatment, and there will, without great care, be some deaths.

No. 4. Represents a cutting, (the top of a shoot,) of Hibiscus Rosa chinensis. It is immaterial how cuttings of this, or plants of similar habits are made, every branch if made into cuttings will throw out roots.



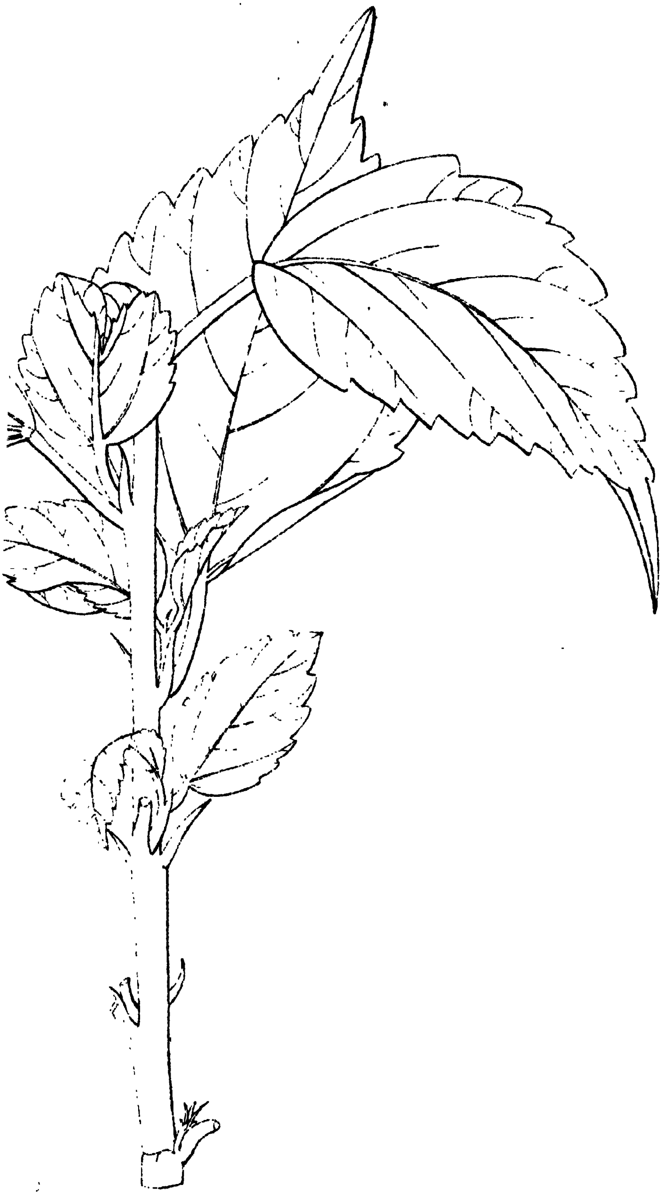
2

*Olea fragrans*

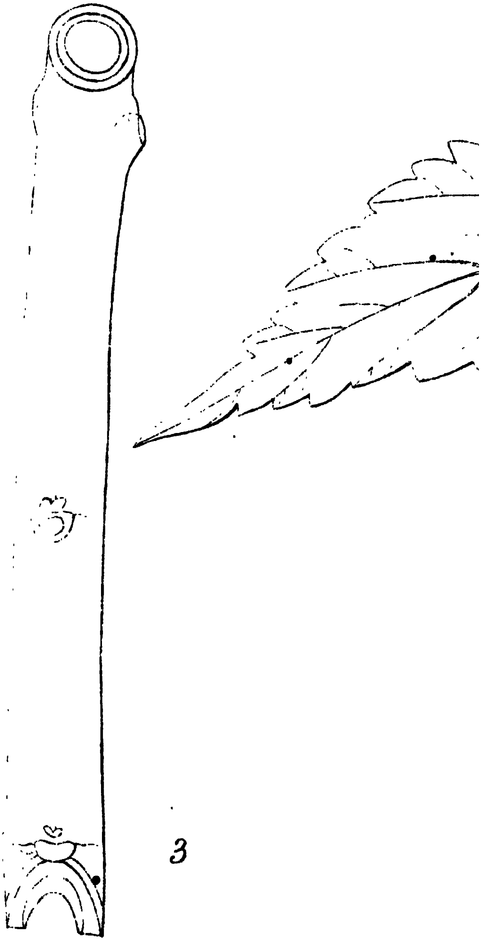


*Bugin villea Spectabilis.*

1



Hibiscus Rosa Sinensis.



3

*Poinsettia pulcherrima.*

# Correspondence and Selections.

## EXPERIMENTAL CULTIVATION OF WHEAT AND BARLEY AT DELHI.

*Extract of a letter from* G. H. Smith, *Esq. to* John Allan, *Esq.*

" I send you some specimens of cotton grown in the Doon, as also various musters of wheat and barley grown by myself in my experimental farm at Delhi.

* * * * * * *

" There are twelve descriptions of wheat and six of barley, all the produce of acclimated seed. I would call particular attention to the Cabool wheat, the original seed of which was sent me by Sir W. McNaghten, in 1834, and which appears to me of a very superior quality.

" My object in sending the specimens is to enable the Society to judge, whether amongst them some cannot be selected fitter for the English market, should wheat ever be largely exported from India. I explained to you personally, why I was unable to reply to the Society's circular regarding wheat. I will here merely state that, as nearly as I can judge, good wheat can generally, in good years, be landed in Calcutta from the Upper Provinces, at the rate of 2 rupees per maund, all charges included.

" I must not forget to mention that all the grains sent suffered much from blight, which followed several heavy hail storms they were subjected to, and which has materially injured their appearance."

1. Mooltanee wheat.
2. Egyptian ditto.
3. Country ditto.
4. Hussungabad, ditto.
5. Cabool ditto.
6. Barbary ditto.
7. Perennial ditto.
8. Wheat from the banks of the Sutlege river.
9. Boulderson's wheat.
10. Daood Khanah ditto.
11. Moturee ditto.
12. Wheat from Mary.
13. Urzee Barley.
14. Boulderson's ditto.
15. Hazarah ditto.
16. Simla ditto.
17. English ditto.
18. Mewah ditto.

### *Report on the above Samples. By* William Haworth, *Esq.*

I have the pleasure of annexing a brief report upon the samples of wheat and barley you forwarded to me on the 29th ultimo. I regret it is not in my power to report more favorably upon the numerous samples I have examined. There are some fine grains amongst them, but unfortunately of too hard a nature for home consumption; one only, the "Cabool wheat," is adapted to suit the wants of the English miller. Most of the barley samples appear to be in bad condition, and are of a peculiar description, such as I have not met with before; they appear to have been husked.

### *Report on Wheat Samples.*

1. *Mooltanee Wheat.*—Hard, flinty, long grain, mixed with a few grains of good soft white; it is not at all suited for the English market on account of its hardness.

2. *Egyptian.*—Long grained, very hard, flinty wheat, and in other respects like sample No. 1, unsuitable for the English market.

3. *Country.*—This would be known in the Calcutta bazar as *Jamallee;* it is a poor small grain, fit only for making into low descriptions of flour for native use: it soon heats in bulk.

4. *Hussungabad.*—This wheat would be called good *Gungajelly* in the Calcutta bazar, and it would make good soojee, biscuit and household bread, &c.: it is too hard and flinty for the English market.

5. *Cabool Wheat.*—This is a good characte rof wheat, well suited for the home market, from its good colour and softness; it is a grain very liable to be attacked by weevils if stored in bags; the sweating of a general Indian cargo would also injure it much, it is not well grown.

6. *Barbary.*—This wheat is like sample No. 1, in form and size of grain, and for the same faults of hardness, &c. is not suited for the home market.

7. *Perennial.*—Resembles in every respect the sample No. 3, or country *Jamallee,* and not suitable for export; the flour made from this description of wheat soon spoils.

8. *Wheat from the banks of the Sutlege.*—Is a very poor, ill-grown, hard grain, not worth carrying to a distant market.

9. *Boulderson's Wheat.*—This is again like sample No. 3 and 7, or exactly like country *Jamallee,* only fit for Indian use.

10. *Daood Khannah.*—Is like sample No. 4, or Hussungabad wheat, say the *Gungajelly* of the Calcutta market, hard, and flinty grain, would make good soojee, and could only be used at home to mix with ill-got English grain, in bad harvests.

11. *Matura.*—Appears to have been grown from a moderately good seed, of the soft white description; the crop I should think, must have been a miserable failure caused by excessive drought; in its present condition it is not fit for food.

12. *Wheat from Mary.*—This is rather a small grain and thick skin, but on the whole a better description of country or *Jamallee* wheat than any of the other samples of the same nature; still it is not a grain suitable for export *to a wheat* growing country.

13. *Barley.*—The samples of this grain which are in fair condition, are small, and thick skin, there is nothing in their appearance to recommend them, and would not compare in quality with the low or middling kinds of English-grown barley.

Such samples as are in bad condition appear to have been heated, and are either of a skinless sort, or they have been husked; the grain of some appears plump and well grown.

(Signed) WILLIAM HAWORTH.

*Cossipore, 8th March,* 1844.

## OIL FROM THE NUT OF THE TERMINALIA CATAPPA, OR COUNTRY

*Extract of a letter from* A. T. SMITH, *Esq. dated Jessore, December,* 1843.

I am in receipt of your favor of the 8th instant, and have to thank you for your encouraging notice of the almond oil, as well as for your kind and ready attention to my numerous requests.

The oil in question was made in the common native mill (the pestle and mortar fashion) and was the produce of some almonds gathered by my *mallee,* in a few mornings, before commencing his labours in the garden; his success every morning depended entirely upon the earliness of his appearance under the trees, as the children about the neighbourhood carry off the fruit at day break, and even earlier for the sake of the kernels. After a sufficient quantity was gathered and allowed to dry in the sun for a few days, which facilitates breaking the nut, I set 4 coolies to work with small hammers, to clear the kernels from their shells, and in 4 days they broke a sufficient quantity for one mill, viz. 6 seers, and which in the course of 3 hours after it was put into the mill produced about 3 pucka seers of oil; the pressing of the oil therefore is of no consideration, as the value of the oil cake, to feed pigs, &c. is sufficient to cover that expense, but the breaking of the nuts is one of chief consideration and would require particular attention, with a view to its reduction, if it be deemed profitable to manufacture the oil on an extensive scale. From the mill the oil was first received into a bason and afterwards filtered through blotting paper. The colour of the oil is that of pale sherry, which is owing to the rind being allowed to remain with the kernels; I deem it necessary to mention this, as on comparing it with the real almond oil this circumstance may prejudice its value. The charge of planting the trees (Terminalia Catappa of Roxburgh) should also be taken into consideration, and of which I am sorry I cannot give any idea, as I am ignorant of the time it would take for the trees to become fruitful, but when once in bearing, the quantity of oil that may be expected from each tree may be safely reckoned at 3 seers annually. The tree is acknowledged to be highly ornamental, and it might be more extensively introduced into parks, avenues, &c. than at present, and even large plains might be planted out with it, with advantage, as the wood is stated by Roxburgh to be useful. I should however like to know to what use it is turned, and would be thankful for any information you can give me on this point.* Moreover, a plantation of this tree is deserving the attention of wild silk or tusser worm growers, since the worm thrives exceedingly well upon its leaves; thus every part of the tree, fruit, leaves, and wood, can all be brought into use, and which I believe is the greatest economy in all kinds of manufacture.

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* *Extract of a letter to A. T. Smith, Esq.*

I regret I cannot give you any definite information on this subject. Roxburgh, as you observe, states the timber to be good; so says Capt. Baker in the remarks appended to his catalogue of Indian Woods, presented to the Society of Arts. Dr. O'Shaughnessy, in his Dispensatory, calls it a valuable timber tree, and adds, that the bark and leaves are very astringent and yield a black paint. An architect of this city, who has, I imagine, as much experience in such matters as any of his profession, replied to my query as follows:—"I have never heard of the Wood of the country almond tree being used. It appears to be a close grained wood, and I should think would answer very well if properly seasoned. It is not procurable in the market."

### *Report on the above Sample of Oil. By* F. J. MOUAT, ESQ., M. D.

I have compared the specimen of oil prepared from the country almond by Mr. A. T. Smith, with a good muster of the ordinary European almond oil in my possession, and find that in taste, smell and specific gravity the former is very similar to the latter, but is deeper in colour, becomes turbid in keeping, and deposits a quantity of white stearic matter. In most ordinary purposes, medicinal and otherwise, the former I think might profitably be substituted for the latter in this country, and if expressed with greater care, and freed from every impurity, might become an article of commercial value and importance.

## EXPERIMENTS AT MANUFACTURING SUGAR FROM THE STALKS OF INDIAN CORN.

### *Extract of letters from* C. B. TAYLOR, *Esq., dated Palamow,* 11*th and* 30*th November,* 1843.

I have the pleasure to inform you that I have this day forwarded to Dinapore to the care of Mr. F. Smyth, a merchant and agent residing at that place, with an intimation to hold the same at your disposal, for the purpose of its being presented for examination to the Members of your Society, a box containing 6 earthen vessels of sugar, or more properly speaking, the condensed juice expressed from the stalks of Indian corn—it cannot I apprehend be called sugar, as it will not *grain*; likewise 2 bottles of spirits distilled from the same substance, which I shall call sugar when alluding to it again, although the word may not be strictly applicable. The spirit contained in the pint bottle, was distilled from sugar, produced from stalks on which the corn had been allowed to ripen, and the stalks left on the field as worthless, after the corn had been plucked off them. The still was a common earthen jar with 3 earthen water pots as condensers, these latter burst during the process of distillation, hence the want of strength, purity and the disagreeable flavour; the sugar was also unrefined. In the second experiment I substituted 3 earthen-ware China jars as condensers, and the sugar used was produced from stalks, off which the spikes of corn had been plucked as soon as they began to form, and the sugar had been refined; the spirit of this distillation you will find in a quart bottle. I am of opinion that a good and palatable spirit may be obtained with a copper still, and having kept sufficient of the goor, have sent for a small still in order to make the experiment. The sugar contained in the earthen vessel, which I have marked No. 1, was produced from the stalks off which the spikes or ears of corn had been plucked when they began to form; the other five vessels contain sugar made from the refuse stalks. I am unable to furnish any data respecting the quantity of saccharine matter to be obtained from any given quantity of stalks, but it appeared to me the proportion was about the same as what is obtained from the sugar cane. This fact, with the cost of production, must be determined in another season.

My attention was drawn to the subject by a paragraph in the *Hurkaru* London Mail of the 4th of March last, and which, to save you the trouble of a reference, I transcribe complete.

"At a meeting of the Chemical Society on the 23rd February, a communication from Professor Croft of Toronto was read, 'on the manufacture of sugar from the stalks of the Indian corn,' an entirely new branch of agricultural industry which is at present exciting considerable interest in the United States. By plucking off the ears of corn as they begin to form, the saccharine matter of this plant is greatly increased, and the juice comes to contain three times more sugar than that of the maple, and equals or exceeds the juice of the ordinary sugar cane, as raised in the United States. By experiments made at Lafayette it is found that one acre of the Indian corn yields 1000 pounds of sugar. This crop has also the advantage, that it comes to maturity in from 70 to 90 days, while the sugar cane requires 18 months, and is precarious."

It is not however a new or recent discovery, you will find it mentioned under the article Maize in the American Encyclopædia. It is also mentioned in Ward's Mexico.

I have the pleasure to acknowledge yours of the 20th instant, and am much afraid that your Jessore member will find himself disappointed in his expectation of obtaining a grain from the *gour* produced from the stalks of Indian corn, as I have made about 8 maunds, and could obtain no such satisfactory result. I suspect that the saccharine matter does not possess the quality of graining, at least the species that your Jessore member and myself have tried, and which I imagine is the same; but as there are a great many varieties of Indian corn, it is possible that we may not possess the variety from which sugar is made in the United States. In this country there are two varieties extensively cultivated, the one producing corn on spikes, and with which my experiment was made, and the other throwing out the corn from the top something in appearance to wheat, but instead of standing erect like it, bending over in a curve : the first of these species is called in Behar, *Muckie*, and in Bengal, *Junar*, and comes to maturity in 70 or 80 days, the second variety is called *Junar* in Behar and *Da-dou* in Bengal, and takes 3 or 4 months before it arrives at maturity. As I should like much to try the description you have obtained from the United States, I should be obliged by your sending me what quantity you can spare, as I should wish to try the experiment on as large a scale as possible. I will send you hereafter another muster of spirituous liquor when I get a copper still.

### *Extract of a letter from* FREDERICK NICOL, *Esq., Jessore, dated* 24th *November*, 1843.

In September last I tried to make sugar from Indian maize stalks. On crushing the stalks through a common horizontal mill upon the native plan, a rather large supply of juice was received of a greenish color, which was boiled in an open earthen pan. The boiling continued for upwards of an hour before the liquor showed any sign of forming itself into a thick consistence; prolonging the process until it was judged to be sufficiently boiled according to the native practice, the material was then poured into a small vessel, and allowed to stand in a cool place for several days, but as it presented no appearance of granulation, it was submitted to another boiling, and while upon the fire, some manufactured sugar was thrown into the pan to give a grain to the material, placing it as before in a cool place to allow the grain to sink to the bottom. The molasses was drained off, but nothing was found but pure dirt. I should have remarked that there was a large quantity of scum skimmed off during the boiling, much more than is to be found upon either date or cane liquor. Having been unsuccessful with the sugar, I manufactured the material into rum by a small copper sampling still upon Corey's principle. The flavour of the spirit was rather unpleasant, but that is to be attributed to too much having been distilled. The stronger rum is, the more fragrant it is. Porter says rum should be manufactured at 35 to 40 over London proof, not above 40, otherwise it becomes harsh and loses the aroma which it possesses at 35 to 40 over proof.

I shall report progress with the American Maize, and hope to be more successful in obtaining good sugar.

### *Report by* J. Cowell, *Esq. on Mr.* Taylor's *sample of Saccharine material.*

I regret that I can give you no favourable report on the article which you kindly sent for my inspection some days ago. It has been burnt evidently in its preparation, and possesses in consequence no granulation and an acid empryeumatic taste. It will not answer in its present state any purpose I fear either for the grocer or refiner.

## REMARKS ON THE USEFUL PROPERTIES OF THE PHORMIUM TENAX, OR NEW ZEALAND HEMP.

### *Extract of a letter from James* A. Wood, *Esq. dated Calcutta, 28th February,* 1844.

I beg to send you a few seeds of the New Zealand hemp plant gathered in the district of "Nelson" in May 1843, and trust they may be found serviceable to the Society. The New Zealand hemp plant is very hardy, and will thrive in any soil or climate, but it likes swampy land the best. It is often met with in New Zealand thriving three or four feet under sea-water. The Sunderbunds, I think, would suit it well, but there is little dependence to be placed on its propagation from seed. It is easiest increased by slips. It produces a superior cordage to any other hemp in the world, being much stronger in proportion to bulk. In fact the whale ships out of Sydney, Van Diemen's Land, and New Zealand will use no other when they can get it, even if they have to pay more for it. Rope made from it is much prized at home, and is fast coming into general use. Sail cloth or canvas made from it is equally superior, and will outlast any other kind known. The plant when once planted requires no further care. Some 3000 to 4000 tons of this hemp will be exported from New Zealand to England this year. It might become a very valuable export from this country, where labour is so cheap, if once introduced. It is rather difficult to manufacture, but the home people would do that. Why don't the Society send to Sydney for a few hundred slips and try it? There are plenty there, and I will be happy to give you a letter of introduction to my friends there requesting them to assist you in shipping a supply.*

### *Suggestions for the Importation of Wheat seed from Australia. Communicated in the following letter from* BABOO MUTTEELOLL SEAL, *dated 31st January*, 1844.

In case you have any Cape or Australian seed wheat that you could spare, I would thank you for a little of each at your convenience.

I wish to try both in that part of the country whence I draw my supplies of grain for the Strand Mills.

I would have them put into the hands of the parties with whom I have contracts, under the strongest injunctions to have the seeds carefully sown and attended to.

In this way considerable good might be done.

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* The Society has acted on this suggestion. An interesting paper regarding this Hemp is published in the first volume of the Society's Journal—ED.

Next to suitable soil, climate and good seed, an annual change of seed is most important, as in the Indigo and every other branch of cultivation for instance.

The native Agriculturists are all sensible of this, but they have no one to help them, and generally they are too poor to help themselves; and are not encouraged as they ought to be.

If the Society have none of the seeds I write for, I would strongly recommend their importing a supply from the Cape and Launceston or Sydney.* The Launceston wheat is considered the best. The cost, at most, would be but trifling, and the benefit might be great.

The best course to follow, after a supply had been got, perhaps, would be to put the seeds into the hands of a party centrically situated for distribution in the wheat districts, as Major Napleton is, for example, at Bhauglèpore.

It is the fine, soft, white description of wheat we stand greatest in need of.

It would also be most desirable that an annual interchange of native seeds should take place amongst the different districts through the same medium. I feel convinced that great improvement in the quality of our own wheat, would result from this plan, if carried out with spirit and discrimination.

In this manner the Bhauglepore Branch Society might again render important service, from its favourable locality, and I would forcibly bring this point to attention.†

It is only by an extensive distribution, and continued interchange of good seeds of the soft varieties of wheat, such as a public body like your Society alone can effect, that any great or lasting benefit will be gained.

But with regard to the wheat, of both kinds, that I apply for, if you furnish me with a little of each, I will let you known the result faithfully, and should it be favourable, repay you back in kind a hundred fold.

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* Steps have been taken to meet this suggestion.—Ed.

† Good seed of the fine soft white kinds of wheat (for fine flour, the hard sorts being valueless) should be gathered and distributed by it from and to all quarters of the grain districts.

## *Economy of Manure.* *By Mr.* TOWERS.

We have felt, and, on several occasions, made allusion to, some peculiar advantages that farmers possess above all other persons, and of which they might avail themselves to procure abundance of gratifications which in the general way, they appear to overlook. Some years ago, a few pages of this Journal were devoted to this subject, and, subsequently, our pen has not been idle, where an opportunity was presented, to prove that, as, from their position and the ordinary course of cultivation, farmers require and possess a store of manure. and of other decomposable substances, which extricate a great volume of heat, they might so apply it as to render it of threefold value to the land, and to the general domestic economy of the establishment.

As it is, a dunghill, or mixen, is nothing more than a mass of fermenting materials exposed, in waste places, to the air for many months, wherein its heat and developed gases are lost for the time, while the liquid drainage is absorbed and rendered perfectly unavailable for the purposes to which it is best adapted. Nature, in one sense, is man's best friend; for the gases received by the atmosphere are therein stored, or so laborated, as to be returned to the earth in showers which nourish while they enliven vegetation; but, nevertheless, man is not true to himself while he neglects to improve any one of his resources.

The cultivation of garden vegetables is not usually treated of in an agricultural periodical, but the subject, with strict limitation, is not irrelevant when it can be made to coincide with the preparatory duties of the farm. Such is the case in the instance we are now prepared to notice.

Nearly ten years have elapsed since attention was first excited to a course of routine in the melon department of a large garden intrusted to the management of a person who has reputably retained his situation during twice that period. The machinery employed in the course may be described in a very few lines. A range of pits, of simple four-inch brick-work, are furnished with any number of lights for the purposes required. Those of the garden in question are fifteen in number; they are seven feet long, three and a-half wide, and they slope at an angle of about eighteen degrees, reckoning the ground level as the base line. The number and dimensions are indifferent, provided they conform to the object in view, and always slope to the south, or south by east.

The first operation was to excavate the ground within the walls to the depth of four feet, and then to fill the space with tree leaves from the park, coppices, and shrubberies, treading the mass, from time to time, till it was rendered compact; it then formed a gentle hot-bed, which (as there was a double range of pits) was used in one instance to grow a set of pine-apple plants, and in another to excite a crop of young potatoes, a quantity of loam being, in the latter case, spread over the leaves after their heat had much moderated. In the meantime, other masses of leaves—the fresher the better—were used as linings to pits, or as hot-beds under frames; and these, collected in autumn, annually, become sufficiently prepared and decomposed, to all intents and purposes, in six or nine months, for the future subjects of the routine.

After the early potatoes, loam was stirred and intermixed with the leaves below to the depth of a full spit, and a fresh quantity of semidecayed leaves, that were prepared during the winter and spring, was laid as a deep hill or ridge under each light. The melon plants for the late crops being ready, one for every hill was planted in its centre, being transferred with an entire ball of roots from its pot, and watered just to settle the soil about them. This planting would take place late in June or early in July.

The lights were closed day and night, and shaded with mats, till the plants were perfectly established and began to grow; but no artificial heat was employed. This was the introductory course of the first season.

We have lately inspected the progress of melons in these pits wherein the lower and now perfectly decayed leaf-soil has never been disturbed for ten years, and have seen the roots wander through the entire substance of the new ridges put on in June. It does not appear that the old-leaf mould is appropriate to the melon, but it forms a mass, and elevates the new ridge toward the glass, a circumstance of moment in melon growing, though, at the same time, it must be insisted on that the new semidecayed leaves, gathered in the preceding autumn, form the pabulum of the melon plants, and a medium more congenial than loam and turf of any kind.

Writers are much in the habit of directing the application of strong maiden loam, and, doubtless, the melon has thriven therein; but it is equally true many failures have occured, and plants are seen to lie torpid for weeks in loam, whereas they start off at once, retain a rich and intense verdure, and bear much fruit of very large size, in leaf mould. Melons cease to bear in September, and then the beds are cleared with all dispatch to receive another crop, the preparation for which consists in levelling the ridges, laying over the surface a coating of decayed spit dung, reduced almost to the condition of *humus*, and forking the whole together to produce a pulverized homogeneous bed, in which strawberry plants are set by trowel, six inches apart, in rows (running from back to front) twelve inches asunder. These plants are obtained either by the runners of July, pegged down close to the strongest plantlet, so that it may take root immediately, and come up with a complete ball in September; or, better, by plunging the smallest pots, (size 60,) filled with light loam, and fastening the runner plant upon its surface. These pots are carefully attended to by watering, &c., till they become filled with roots, when the plants and balls are transferred to others of a large size, the soil of which is enriched by adding one-third of mellow dung. This mode of raising strawberry plants is certain, but gardeners find it take up too much time; for the amateur, however, and the farmer who can spare a hand for the work, it is admirable. The best variety of strawberry is the true Keen's seedling, its fruit bearing heat extremely well, and being heavier, bulk for bulk, than that of any other sort, unless we may except (not yet, however, sufficiently proved) the *British Queen.*

The strawberries being planted and watered, the sashes are closed, and kept close for some days, till the roots lay firm hold of the soil; when air is given by degrees, and, at length, before the frost sets in, the sashes are removed, and the plants exposed to the air, by which they not only are fortified, but brought into a state of rest. But, on the approach of vigorous weather, the sashes are put on, and kept closed every night, though air is given by day when there is no falling weather.

After turn of days, and as the power of the sun increases, air and light waterings are given to prepare for the growth, which never fails to commence many weeks ere strawberries in the best open ground give any signs of vegetation.

When the runners protrude, they are removed, and every care taken to promote strong growth, without permitting vegetation to become rank by "drawing," as it is called, through want of air.

The crops thus produced are amazing. We have known 400 ounces to be gathered in April, under a few lights, and sold to a collector of fruit—who, of course, would purchase cheaply—for £10, money down. The strawberry plants impart some loam to the bed; but this is digged into the leaf-mould beneath, after the fruit is gathered, when the plants are either destroyed or moved to some plot in the garden where it is intended to make a fresh plantation.

There is a considerable demand for this fruit in the neighbourhood of great towns, about the month of April, five or six weeks before the time when they ripen in the open air; and, near London, persons make a business of calling at gentlemen's gardens to collect fruit through the season. For strawberries they pay from 9d. to 4d. per ounce; gather the fruit, pay for, and take it away without any trouble to the grower. In the meantime, the public pay, in the shops, from 10s. 6d. to 1s. 6d. per ounce. An amazing difference, which, however, is of no avail to the grower, who, were he to apply to the great fruit-shops, would receive very little extra remuneration, though he were obliged to incur the entire trouble and risk of conveyance.

Most persons force strawberries in pots—hence the supply is limited; but were pits adopted, the plants would be abundantly more productive, and the pits always in requisition for successive crops, which may be rendered profitable to a greater or less extent. In the establishment which we have taken as a model, the crop after strawberries continues to be late melons, prepared for annually by the leaves collected in the preceding autumn.

There are two or three objects of moment to be considered. The first is a range of pits, say of twelve lights, divided by a four inch brick wall into three departments, which may provide every sort of vegetable or fruit which a farm could require, early and late, by aid of the dung at hand, which might be timely and advantageously heaped at back, and, indeed, round the erections, while, by a simple contrivance, the liquid drainage could be made to pass into a cemented tank furnished with a pump. Experience, and the object in view, must regulate the heat to be applied; but whether the manure were hot or cold, it might be profitably deposited around the walls. Farmers, therefore, possess appliances which the gardener is frequently obliged to purchase at high prices. Second leaves of trees, reduced to that condition wherein they become brown, moist, adhesive massses, are so congenial to the roots of the melon, that it is no uncommon thing to see them trace ten or more feet in length, sending forth laterals even to the surface in every direction.

Black perfectly reduced *leaf-mould* is one of the purest conditions of vegetable aliment; in it the strawberry revels; but for the melon the hill or superstratum must be renewed yearly.

In a pit of three divisions, early potatoes may be substituted, in one of them, for strawberries, and be off in due time for late melons. Early melons can be raised by warm linings applied in March, and *cucumbers* at any season of the year.

In the garden referred to, the same soil has remained in one large pit for ten or more years; and never have we seen fruit produced in greater abundance or of finer quality than in that department. Why then should a farm be destitute of an appendage which it is calculated to support in a style altogether superior?

We have of late years heard a good deal concerning diseases and failure of potatoes; and in the present season mention is made of blanks in the rows. We have proved, and so have many others, that a blank is no proof of a failure; as, from some cause, a haulmless potato may furnish a numerous and fine progeny of tubers. This circumstance will serve as an introduction to an experiment upon the production of very early potatoes, which, coming from the pen of the late Mr. Knight, in a private letter, dated June 12, 1832, may be much appreciated, and certainly will not be irrelevant to our subject. He wrote thus—

"I collect the largest of my early potatoes so soon as ripe, in the end of July, and lay them close to each other upon the ground, covering them about two inches thick with mould. Thus circumstanced, they vegetate in the autumn; and if the young shoots then produced be taken off, and the tubers preserved, *they generally will not produce foliage*, but will immediately generate tubers. These will ripen more or less early in spring, in proportion as the tubers are kept more or less warm; and it will be easily practicable to obtain young potatoes of exceedingly good quality during the months of May and June. There will always be periods of considerable length between the period of the tubers having acquired their growth, and subsequently becoming *excitable*, and during that period they are very good. Under favourable circumstances, *three bushels* of old tubers will afford about *one* of new at this period, (May and June.) Now, as I can certainly raise, and am doing it, 600 bushels and upwards on the acre, the produce of half an acre of such potatoes in young tubers, if sold, must be a very profitable crop."

This process had previously been communicated to the Horticultural Society of London, and it proves that, if, by accident or design, a first development of shoots be removed, and the tubers then remain for some weeks out of the ground, they will be very likely to produce a new crop of tubers within the soil, without exhibiting any appearance of external vegetation.—*Journal of Agricultrue. Oct.* 1843.

*On the Manuring and Steeping of Seeds. By* JAMES F. W. JOHNSTON, F.R.S.S.L. *Honorary Member of the Royal Agricultural Society of England.*

Public attention has lately been drawn in this country to the possibility of so manuring or otherwise doctoring the seeds of our usual grain crops, before they are put into the ground, as to do away with the necessity of manuring the soil itself. It has been long known to practical farmers that, by steeping their seeds in urine, in salt and water, or in other solutions, and sprinkling them while wet with quicklime, their growth is in many cases promoted, and rust, smut, and similar diseases, in great degree prevented. It has been observed also in regard to potatoes, that in some soils a dusting of lime makes the cuttings more productive than they would otherwise be, and that, when powdered with gypsum, they thrive still better. The absolute effect indeed of all such applications to the seed-corn or to Potaotes, will in every case be modified by the kind of soil in which the seed is sown. If the soil abound in common salt, the salting of the seeds will be less efficacious, while if it be rich in lime or in gypsum, the dusting of the potatoes with these substances will produce a less striking effect. Yet the above observations of practical men shew that it is possible in certain circumstances, and by the use of certain substances, so to doctor or manure the seed we intend to sow, as to make the growth of our crop more sure, and the return of our harvests more abundant.

From this *limited* conclusion, which is justified by experience, some persons have hastily leaped to the *general* assertion, *that all seeds may be so doctored as, in all circumstances, to grow more luxuriantly*—and still farther, *that they may be so treated as to render unnecessary any manuring of the soil in which they are to be sown.*

It is in Germany that this latter broad assertion has been most confidently made and most pertinaciously repeated. It has met with some credence also among ourselves, from persons chiefly who, like the German fathers of the statement, know a little more than the generality of practical men, but who do not know enough to enable them to see the difficulties that beset their own views, nor the limits within which their statements are true.

It will, no doubt, interest the British farmer to read the statements of those who bring forward these novel views, and to consider the degree of probability which exists as to their expectations being realized.

The great discoverer in this new line is Franz Heinrich Bickes of Castel, near Mayence, who has published a pamphlet under the title of an "*Account of the Discovery of a Method of Cultivating the Soil without Manure*,"* in which he thus speaks :—

"The discovery—of cultivating the soil without manure—has been carefully verified in different countries, and in the most dissimilar soils.

"It is twelve years since the discovery was made, and it has, during this time, been more and more tested.

"The experiments have been made at various seasons of the year, and the same crop has been repeated on the same soil without regard to the usual rotation of crops.

"The cost is very trifling—a shilling or two an acre—and the supply of substances used instead of manure is inexhaustible."

He then expatiates on the importance of his own discovery.

"It is not good," says Plato, "to push our investigations too far; the natural sciences find their limits, beyond which the mantle of Isis covers what is mysterious. Can any one reveal the nature of force, of life, and of motion? *The mantle of Isis is now, by this discovery, at length removed!*

"It is not the discovery of a mere crude substitute for manure, but the result rests on a knowledge of the nature of plants, by which the vital power is increased in all respects, and their existence elevated and ennobled!"

Here follow some of the results of his new method.

"Who can assign limits to the growth of a plant?

"I possess dried plants of wheat, consisting of fifty-six and fifty-seven stalks. Indian corn, grown in a poor soil, with three or four stems and eight or nine heads. Sunflowers eleven feet high, with flower disks fourteen inches in diameter, and seeds as large as small coffee beans. Potatoes above seven feet high, and tubers in proportion.

"Varinas and Havannah tobacco have, for eight years preserved the well known flavour of their native country.

"Drift sands have produced crops equal in quality to the neighbouring loams.

"All parts of the plants, stems, roots, leaves, seeds, fruits, have been equally improved—the tubers of potatoes, and other roots, are tenderer and more agreeable to the taste. Turnips and fruits more abundant in sugar, flowers of brighter hues and higher perfume.

"Agriculture can now be prosecuted after an entirely new method. Manured every year almost without cost, plants will develope themselves almost spontaneously, and yield the largest returns.

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* Mittheilung uber die Erfindung der Boden ohne Dunger anzubauen, von Franz Heinrich Bickes in Kastel bei Mainz. (Dusselthal bei Dusseldorf, 1843.)

" A rotation of crops is a mere beggary from the soil! Every third, fourth, or fifth year, the farmer manures a third, a fourth, or a fifth of his whole farm, and in return he has the pleasure of seeing his fields green without putting much into his pocket—while now the most profitable crops may be raised with a luxuriance hitherto unknown."

The author here calculates the present cost of manuring the soil, and supposing the new method to cost only one-fifth, shews how many millions the adoption of it would annually save to every nation in Europe. He then adds—" Consider how land in every country at present yields little or nothing, and yet might be brought into the greatest fertility, and how many happy people might enjoy life upon it who are at present a burden to the state.

" Look to England. What fearful want now exists in that country, the resources of which are every year diminishing. Men daily die of hunger, and the most talented statesmen are without hope of mitigating the evil. For several years past the city of London has been paying 24,000,000 of florins of poors' rate, while the whole of Germany pays only 60,000,000.

" Berlin pays annually 410,000 florins, and 40,000 souls are tax-free. All these could find, *in the neighbourhood*, land susceptible of cultivation, on which they could not only live, but from which they could pay taxes to the state."

" Potatoes are vegetable bread; Indian corn also is wholesome nourishment; both grow beautifully on the lightest drift sand: *with the former the whole sea-shore might be covered.*"

The practical farmer will justly consider that Bickes' mode of treating his seed potatoes must be something wonderful, to make them grow well on the sandy downs that line so much of our coasts. But he proceeds to give testimonials as to the efficacy of his method, and the truth of his statements. These testimonials are from practical men in various parts of Germany, and must be deserving of credit *to a certain extent.* It will be proper to hear what they say. The first two are dated Vienna, 1829, and are signed by four persons; they refer to seed sown in the imperial gardens. From the second of them I quote the following:—"In general, the plants from the prepared seeds exhibited a very much stronger growth, were of a deeper green, had thicker stems, finer and fresher leaves, larger grain, and the grain was thinner skinned, and therefore contained more meal. In particular,

" 1. The hemp was of a much larger size, and had many side shoots bearing seed.

" 2. The Indian corn had more heads.

"3. The buckwheat was upwards of three feet high, and full of seed.

"4. Wheat, rye, barley, and oats are thicker, and have more numerous stems, larger ears, and more grains in each.

"5. The Lucerne was beyond all comparison stronger, had more shoots, and its roots were as thick again.

"6. The disks of the sunflower were doubled in diameter, the cabbage had large heads, the cucumber large fruit, while the unprepared seed yielded nothing."

I quote further what must be considered as a mere opinion, adopted in part, no doubt, from the sanguine Mr. Bickes himself:—"Since this highly beneficial discovery renders all manure unnecessary, and can be applied to the poorest soils without the necessity of having a previous stock of cattle to produce manure—which, from want of fodder, is in many places impracticable—as the material is of little cost, and as the corn crops will require less seed, its benefit to agriculture must in many respects be incalculable."

The next two testimonials are dated from Offenbach, in August, 1830, and are signed by five persons. Three of these had allowed their seed to be prepared by Mr. Bickes, and thus speak of the effects when sown upon their own fields:—"The prepared wheat had from ten to fifteen stalks from each grain of seed, and the ears and grain were larger. The rye had nearly one-half more, and larger grains in the row. The two-rowed barley had from eight to fifteen stalks from a single seed; generally the produce was greater than on the best fields of their farms. The prepared flax was one-half heavier in stems and seed capsules, and the latter were double in number; and when the unprepared had already become yellow, the prepared was still of the deepest green. But the potatoes excelled everything yet known in the most productive fields. From a single potato there were seldom less than ten and sometimes seventeen strong stems, while, in the best fields, there are seldom more than one-third of this number."

All other plants, clover, beans, turnips, &c., are said to have been equally benefited. One-fourth only of the usual quantity of seed—of wheat and rye—was sown on a poor unproductive clay, and yet the produce was greater than on the newest land of good quality, though aided by manure.

Two testimonials follow, dated September, 1831, signed by burgomasters, town-councillors, gardeners, schoolmasters, farmers, and land-valuers, seventeen in number. The following is an extract from the one which relates to experiments made in a garden at Budingen:—

"1. Several sunflowers had a height of ten to eleven feet, the foot of the stems being eight and a-half and nine inches in thickness. The stems consisted of firm wood, and contained as much combustible material as young fir trees of eight or ten years of age.

"2. Ten or twelve potato plants gave on an average thirty large potatoes each, and had stems seven feet in height.

"3. Fifteen stalks of Indian corn had on an average five heads each, some having as many as eight or nine heads to a single plant."

The next experiments quoted by the author were made at Amsterdam in 1834:—

"The buckwheat was four and a-half to five feet high, the flax had four to five stems from each seed, the Indian corn was nine to ten feet in height, and had four to five heads from each seed. The white clover was as large in the leaves and stems as the red clover usually is; the red clover and lucerne three feet high.

"These results were obtained from the prepared seeds alone, without manure, on a depth of six or eight inches of the drift sands of the Downs, arranged in beds for the purpose of the experiments."

Between 1834 and 1839 nothing is recorded regarding the progress of the author's discovery or researches, and he leaves us to infer that, in this interval, nothing had been done—since, under the date of September, 1839, he inserts only an extract from a Mayence newspaper, containing a statement of some of the results obtained in the former years. To this is subjoined one other testimonial, dated November, 1841, declaring that his potatoes, sown on unmanured soil, were superior to any others in the neighbourhood of Castel, where Mr. Bickes resides.

I think the conclusion which is fairly to be drawn from a careful perusal of this pamphlet is, that, for a few successive years, the author had made experiments upon the preparing of seeds, and out of a number of less successful had obtained some very interesting and striking results; that he had then laid the matter aside for about as many years more, and again, in 1841, made a solitary experiment or two, which he has incorporated with his previous results in his pamphlet of 1843. For twelve years, therefore, he has been more or less occupied with the subject, but during all that time he has never published or given any account of his process for preparing the seeds according to his method. He is one of that class of discoverers who wish to sell their secrets, and, by magnifying their importance, hope to derive a larger profit from divulging them. With such men the true friends of agriculture can have no sympathy.

I do not think, however, that his pretensions are wholly unfounded, or that, by a skilful study of the preparation of seeds, much good may not hereafter be derived by practical agriculture. The reasons for this opinion will appear in the sequel.

Another German pamphlet on this subject has lately appeared from the pen of a Mr. Vietor, an apothecary at Neiderholm, in Hesse Darmstadt, under the title* of "*The Manuring of Seeds, or a Simple and Cheap Cultivation of the Soil by the Artificial Manuring of Seeds, by which, at the same time, the Rust and other Diseases of the Corn Crops are prevented, practically tried for Five Years, and proved on a large scale.*" By C. L. VIETOR. This author describes his methods, and is in so far more worthy of the attention of the practical man. Before detailing these methods, however, I shall insert a few of his preliminary observations.

As the principle upon which the manuring of the seeds ought to be preferred to that of the soil, he remarks "that the manure can never be so equally distributed through the soil that the due proportion of food shall be given to each seed or plant; and that, besides, before the plant comes to require it, much of the organic matter of the manure has become decomposed and lost, and that even the inorganic matter is liable to assume forms of combination in which it can with difficulty be made available to the nourishment of the growing plant."

These disadvantages, he says, may be avoided by manuring the seeds themselves which we wish to grow, while, at the same time, the following advantages will attend the adoption of this method:—

"1. The same crop may be repeated on the same soil though already exhausted, or even in any usually unfruitful soil.

"2. We can manure the seeds with those special substances only which it is not likely to find in the soil, or of which it has been exhausted by previous crops."

This is an advantage which is possessed by all saline and mineral manures, and is one of those benefits which will appear more clearly and strikingly to the practical man as he becomes more familiar with the natural wants of the crops he wishes to raise, and with the kind of substances which are present in his soils and in the manures—such as farm-yard manure—which he usually employs in preparing them for the seed.

"3. As the rotation of crops is rendered necessary chiefly by the abstraction of saline substances from the soil, it may be rendered unnecessary by adding again these substances in such a way as to be within the reach of the seeds only. Thus, by steeping the seeds in sal-ammoniac, and drying them with flour, the deficiency of salts may be supplied.

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* Die Saamen-dungung oder einfache und Wohlfeile anbauung des Bodens durch Kunstliche dungung des Saamens, &c. &c. Frankfurt am Main, 1843.

"4. The rust and other diseases of corn plants are owing either to an excess or to a deficiency of food in the soil. These extremes can be best avoided by manuring the seed itself with the proper materials and in the proper degree. "Thus," he says, "in a field of wheat after oats, upon a poor soil, a portion of the seed which had been prepared with sal-ammoniac, gave only a light crop, while another portion, prepared with oil also, gave a crop twice as heavy."

Influenced by the considerations above stated, some of which may, to a certain extent be regarded as questionable, Vietor has been induced to try the manuring of the seeds before they are sown, and, from the success which has attended his results, to recommend it to others. The substances he employs, and his mode of using them, are as follow:—

*Substances employed.*—1. *Blood,* in the liquid state, is mixed with one-eightieth of its weight of glauber salts, dissolved in a little water; when thus mixed, it may be kept for a long time in a cool place without congealing or undergoing decomposition; or clotted blood may be dried either alone or mixed with a little earth or powdered clay, and then reduced to fine powder.

2. Wool, hair, parings of leather, horns, hoofs, and bones, are charred in close vessels, until they are capable of being reduced to powder.

3. The dung of all animals is dried and reduced to powder.

4. Fats and oils of all kinds are mixed with so much earth, clay, or rye-meal, as will enable the whole to be reduced to powder. Oil-cakes are also powdered for use.

*Mode of using them.*—He makes up a semi-fluid mixture with which he mixes the seeds, and then he dries up the whole by the addition of the powdered manures already prepared. His semi-fluid mixture is thus prepared:—For a bushel of wheat or other grain, take

20 to 30 lbs. of clay in fine powder.

1¼ lbs. of pounded sal-ammoniac, or 3 lbs. of common salt.

3 to 5 quarts of whale, rape, or other cheap oil.

15 to 20 quarts of fresh blood, or blood kept in a fluid state by means of glauber salts, or, in the absence of blood, as much water.

3 to 5 lbs. of linseed meal or pounded oil-cake.

These are mixed together intimately, and water added, if necessary, to make a half-fluid mass. The seed is then to be poured in and stirred about till every seed is completely enveloped by the mixture. A layer of one of the following dry mixtures is then spread on the floor, over it the manured seed, and then another layer of the dry powder. The whole is then stirred together and left to dry.

*Dry Mixtures.*—Of these drying mixtures he describes several, consisting chiefly of powdered clay, mixed with one or other of the dry powders already mentioned. Thus he recommends mixtures of

1. 75 of powdered clay, 8 horn shavings, and 17 of bone dust.
2. 85 of clay, with 15 of fluid, or 5 of dried blood.
3. 85 of clay, 5 of charred hair, and 10 of oil-cake.
4. 60 of clay and 40 of powdered dung.
5. 70 of clay, 25 of charred leather, and 5 of bone dust.
6. 80 of clay, 1 of fat, tallow, or oil, and 2 of powdered dung.

These are all to be finely powdered and intimately mixed. The principal alleged use of the clay is, to make the other substances cohere together, and to attach them more strongly to the grain.

When the mixture of grain and manure is dry, it is broken up with the hand and thrown upon a fine sieve, which allows the loose powder to pass through and the uncovered grains, and then upon a coarser sieve, through which the dressed seeds pass, leaving the lumps, in which two or three seeds may be present, and which are to be carefully broken up. He prescribes further, that much caution is to be used in completing the operation so quickly that the grain may not be permitted to sprout, and thus become liable to injury during the succeeding operations.

When it is wished to grow corn after corn in fields manured in the usual way, Vietor recommends mixing, for each bushel of seed, two to three pounds of sal-ammoniac, or four to six pounds of common salt with ten to fifteen of rye-meal, adding a little water, stirring the seed well among it, and drying the whole in a stove.

Such is the substance of Vietor's pamphlet and observations. I have stated them pretty fully, because I think he deserves this much at the hands of those who are interested in the progress of practical agriculture; because he has stated the reasons for his procedure, has described his processes fully, and claims neither great merit nor great reward for alleged great discovery. Besides, there is a show of reason in what he states. For though we may very fairly doubt, or perhaps entirely disbelieve, that the quantity of manure with which he envelopes his seeds can be sufficient to supply the wants of the crop that is to spring from them, yet there can scarcely be a more economical way of employing the same quantity of manure—one in which there will be less waste of it, or in which it will be more useful to the growing plant. In every way of applying manure to the soil which has hitherto been adopted, a large portion never reaches the roots of the. plants. Even when drilled in along with or near the seeds, a notable quantity escapes from the neighbourhood of the roots, and is more or less completely lost to the crop it is intended to feed. Such must obviously be the case to a very much smaller extent where it is in actual contact with the seed it is to nourish, and actually envelopes it.

Still it is doubtful whether the gain or saving effected by this method will be equal to the cost of time and labour which it involves. Should such a mode of manuring be found easily practicable, more skilful mixtures than those of Vietor—such as would be more certain to succeed, and such as would be fitted specially to aid the growth of this or that kind of crop—could easily be suggested.

In illustration of this opinion, I will here briefly state the facts from which I am led to believe that considerable benefit may in reality hereafter accrue to practical agriculture from a careful study of the effect of certain known steeps or prepared mixtures upon the after-growth of the seeds upon which they have been tried.

1. The quantity of inorganic matter contained in the grain of wheat, oats, barley, &c., is comparatively small. In wheat and barley it varies from 1½ to 2 per cent. of the whole weight; in oats it is about 3½ per cent., but a considerable proportion of this is contained in the husk with which the oat is usually invested. But, though small in quantity, this inorganic matter is absolutely essential to the perfect condition of the seed, and to the healthy growth of the plant that springs from it.

2. When seeds are steeped in water, they swell and increase in bulk. They absorb a portion of the water and of any saline substances it may hold in solution. Now, if the small quantity of saline or inorganic matter which exists in seeds does really promote their growth, may not a larger quantity promote it more? May not the growth be more luxuriant if the seed be steeped in water containing saline substances in solution, and be thus made to absorb an additional proportion? It does not appear unreasonable to suppose that a bushel and a-half of seed-wheat may be made to absorb a pound of saline matter. This appears, indeed, to be only a very small quantity, and yet, if absorbed, it would add one-half more to that which the seed naturally contains. We cannot pronounce beforehand, with absolute certainty,

that by this absorption the growth of the seed would be greatly promoted, though both theory and practice concur in rendering it probable. Thus the experiments of Bickes—whose mode of preparing seeds appears to be a simple steeping in saline solutions—appear decisive in favour of the opinion that such artificial additions to the saline matter of the seed do really, in some cases at least, greatly promote the growth of the seeds, and increase the luxuriance and produce of the after crops.

The fact that saline manures are beneficial, in many cases, to the growing crop, when merely applied to the soil, is in favour of the same view. The salts, it is true, when applied to the soil, enter the plant by its roots; but, nevertheless, their action is simply to yield saline matter to the plant in larger quantity than it could otherwise readily obtain it from the soil. This additional supply might at once be given it, to a certain extent, by steeping the seed itself.

3. Further, we know that some seeds germinate much more readily and certainly than others. We know, also, that the proportion of inorganic matter, or of ash they leave when burned, varies in different samples, of seeds of the same kind. That contained by wheat, for example, is sometimes 1½, sometimes 1¾, and sometimes nearly 2 per cent. of its weight. Can this difference in the growth of seed and the difference in the proportion of saline matter have any connection with each other? Do some germinate feebly, do others fail entirely, because they contain too small a proportion of the usual saline constituents of the seed? Would they germinate better if more were by some means given to the seed? The same experiments of Bickes, upon the effect of steeping, seem almost to answer these questions in the affirmative; they, at least, render it very probable that some such relation does exist between the two differences to which I have alluded. The same may also be said of the observation made by Mr. Fleming of Barochan, that seed wheat, which had been dressed the previous year, with certain saline substances, grew more luxuriantly, and gave a better crop than that which, though grown on the same field, had not been so top-dressed. It is not very unreasonable to suppose that this better growth of the dressed seed might be owing to its having obtained, from the substances applied to the soil, a larger proportion of saline matter than that to which no top-dressing had been applied.

Still these circumstances only render probable the opinion to which I have adverted. They point out, however, new series of researches, both in the field and in the laboratory, by which the opinion will be tested, and either refuted or confirmed. In the field, experiments must be made with different seeds, dressed and undressed. In the laboratory these seeds must be examined, the proportion of inorganic matter they respectively contain determained, and if this inorganic matter be equal in quantity in seeds exhibiting different powers of germination and growth, the difference in the kind or quality, as well as in the quantity of the ash, must be more or less rigorously ascertained. By these united methods of investigation, we may hope, by and bye, to make out what are likely to be the real and constant effects of steeping upon seeds—to what kind of seeds or roots it may be applied most beneficially—under what circumstances this treatment ought to be especially adopted—what kind of saline substances ought to be applied to each species of seed, and in what proportions—and what is the nature of the influence they may be found to exercise in promoting or otherwise modifying the growth of the after crop.

In the meantime, there are two principles by which our trial of steeps ought to be regulated, by which the saline substances we may employ with advantage in our first experiments in the field and upon different crops are distinctly pointed out. In a future paper I shall explain these principles, and state the practical suggestions which may be drawn from them in regard to experiments upon the steeping of roots and seeds.—*Journal of Agriculture for January*, 1844.

DURHAM, *20th November*, 1843.

## *General Catalogue of Plants in the Honourable Company's Botanic Garden, Calcutta.*

(Continued from page 535.)

MALVACEÆ.—Continued.

Hibiscus mutabilis, × ‡
,, scandens, ‡
,, chinensis, ‡
,, tricuspis, × ‡
,, surattensis, ‡
,, diversifolius, ‡
,, liliiflorus, × ‡
,, Sabdariffa, ‡
,, radiatus, × ‡
,, longifolius, ‡
,, tetraphyllus, ‡
,, Trionum, ‡
,, sulphureus, ‡
,, cannabinus, × ‡
,, esculentus, ‡
,, furcatus, ‡

MALVACEAE,—Continued.

Abelmoschus moschatus,
,, ficulneus, ‡
,, longifolius, ‡
,, pentaphyllus, ‡
Decaschistia crotonifolia,
Paritium tiliaceum,
,, Bealei, ×
,, sp.
Gossypium obtusifolium, ‡
,, arboreum, ‡
,, herbaceum, ‡
,, religiosum, ‡
,, vitifolium, ‡
,, acuminatum, × ‡
,, barbadense. × ‡

### ELÆOCARPEÆ.

Elœocarpus aristatus, ‡
,, serratus, × ‡
,, rugosus, ‡
,, longifolius, ‡
,, lucidus, × ‡
,, sp.
,, sp.

### DIPTEROCARPEÆ.

Hopea faginea, × ‡
,, odorata, × ‡
Shorea robusta, × ‡
Dipterocarpus alatus, ‡
,, turbinatus. ‡

### TILIACEÆ.

Corchorus olitorius, ‡
,, fascicularis, ‡
,, fuscus, ‡
,, decemangularis, ‡
,, trilocularis, ‡
Triumfetta ovata, ‡
,, Bartramia ‡
,, oblonga, ‡
,, trilocularis, ‡
Grewia columnaris, × ‡
,, microstemma, × ‡
,, oppositifolia, × ‡
,, floribunda, × ‡
,, asiatica, × ‡
,, pilosa, ‡
,, occidentalis, × ‡
,, polygama, ‡
,, viminea, × ‡
,, sepiaria, × ‡
,, sapida ‡
,, sclerophylla, ‡
,, umbellata, ‡
,, abutilifolia; × ‡
,, Microcus, ‡
,, paniculata, ‡
,, ovalifolia, ‡
,, tomentosa, × ‡
,, didyma, ‡
,, denticulata, ‡
,, humilis, × ‡
,, aspera, ‡

### TILIACEÆ,—continued.

Berrya Amomilla, × ‡
Brownlowia elata. × ‡

### LYTHRARIEÆ.

Ammannia vesicatoria, ‡
,, octandra, ‡
,, multifloria, ‡
Heimia myrtifolia, × ‡
Ginoria americana,
Lawsonia inermis, × ‡
Grislea tomentosa, × ‡
Lagerstrœmia elegans,
,, indica, × ‡
,, Reginæ, × ‡
,, macrocarpa, × ‡
,, parviflora, × ‡
Duabanga sonneratioides. × ‡

### MELIACEÆ.

Qu[illegible]sia heterophylla, ×
Turrœa pinnata,
Melia Azederach, ‡
,, composita, × ‡
,, robusta, × ‡
,, sempervirens, × ‡
Azedarachta indica, ‡
Mallea Rothii, × ‡
Amoora Rohitoka, × ‡
,, cuculata, ×
Milnea edulis, ‡
Walsura piscidia, × ‡
Monocyclis robusta, ‡
Epicharis exarillata, × ‡
,, mollis, × ‡
Sandoricum indicum, × ‡
Ekebergia integerrima, ‡
,, indica, ‡
Heynea trijuga, × ‡
,, quinquejuga, ‡
Guarea mollis, ‡
Aglaia odorata, × ‡
,, spectabilis, ‡
,, undulata,
,, Careyana, × ‡
Cedrela Toona, × ‡
Swietenia Mahagoni, × ‡
,, febrifuga, × ‡

### MELIACEAE,—Continued.

Swietenia Chickrassia, ‡
,, Chloroxylon, × ‡

### AURANTIACEÆ.

Atalantia pubigera,
,, monophylla, ‡
Triphasia trifoliata, ‡
Limonia alternans, ‡
,, caudata, ‡
,, acidissima, ‡
Cookia punctata, ‡
Murraya exotica, ‡
,, sumatrana, ‡
Bergera Kœnigii, ‡
Micromelum integerrimum, ‡
Clausena nana, ‡
,, suffruticosa, ‡
,, punctata, ‡
,, sumatrana, ‡
,, heptaphylla, ‡
Glycosmis citrifolia, ‡
,, pentaphylla, ‡
,, oxyphylla, ‡
,, tetraphylla, ‡
Feronia Elephantum, × ‡
Ægle Marmelos, × ‡
Citrus acida, × ‡ 11 varieties,
,, medica, × ‡
,, Aurantium, ‡
,, decumana, × ‡
,, Banksii, ‡
Luvunga scandens, × ‡
Sclerostylis atalantioides, × ‡

### SPONDIACEÆ.

Poupartia axillaris, × ‡
,, Mangifera, × ‡
,, acuminata, ‡
,, dulcis, × ‡
,, longifolia, × ‡
,, lutea, ‡
,, borbonica,
Shakua excelsa.

### RHAMNEÆ.

Zizyphus trinervis, ‡

### RHAMNEAE,—Continued.

Zizyphus hamosus, × ‡
,, latifolius, ‡
,, flexuosus, ‡
,, Jujuba, × ‡
,, vulgaris, × ‡
" glabra, × ‡
,, Caracatta, × ‡
,, Nepetta, ‡
,, incurva, ‡
Berchemia floribunda, ‡
Ventilago madraspatana, × ‡
,, sp.
,, sp.
Rhamnus virgatus, ‡
,, circumscissus, ‡
,, lucidus, ‡
Hovenia dulcis, × ‡
Colubrina asiatica, × ‡
,, napalensis, × ‡
Gouania leptostachya, × ‡
,, madagascariensis. × ‡

### CHAILLETIACEÆ.

Chailletia erecta,

### BURSERACEÆ.

Boswellia serrata, × ‡
Canarium commune,
,, strictum,
,, geniculatum,
Icica indica, × ‡
Balsamodendron Commiphora, ×
,, Roxburghianum, ×
Sorindeia madagascariensis, × ‡
Garuga pinnata, × ‡
,, madagascariensis,

### EUPHORBIACEÆ.

Sarcococca prunifolia, ×
Buxus sempervirens,
Securinega borbonica,
Cicca disticha, × ‡
Emblica vulgaris, × ‡
Kirganelia elegans, ‡
Xylophylla angustifolia,
Phyllanthus Juniperi,

EUPHORBIACEÆ,—Continued.

Phyllanthus cordatus,
, simplex, ‡
, obcordata, ‡
, retusus, × ‡
, Leucopyrus, ×
, Niruri, ‡
, Simsianus, ‡
, Arenaria, ‡
, multiflorus, × ‡
, incanus, ‡
, reticulatus. ‡
, bæobotryoides, ×
, patens, × ‡
, reclinatus, ×
, tetrandrus,
, cerasifolius,
, juniperinus, ×
Andrachne trifoliata, × ‡
Clutia collina, × ‡
, semperflorens, ‡
, oblongifolia, × ‡
, spinosa, ‡
, scandens, ‡
Bradleia multilocularis, × ‡
, nitida, × ‡
, hirsuta, ‡
, sinica, ×
Briedelia attenuata, × ‡
, amœna, × ‡
, Berryana, × ‡
, lanceæfolia, × ‡
Croton variegatum, ×
, latifolium, ×
, Tiglium, × ‡
, oblongifolium,, × ‡
, elœocarpifolium, × ‡
, polyandrum, × ‡
, urophyllum,
, lepidotum,
, drupaceum, × ‡
, lœvigatum, ×
, bineurosum,
, punctatum,
, iliciodorum, ×
, rubrum, ×
Hæmatospermum neriifolium, ‡
Jatropha Curcas, ‡
multifida, × ‡
glandulifera, ‡

EUPHORBIACEÆ,—Continued.

Jatropha carnosa,, × ‡
, pandurifolia,
Janipha Manihot, × ‡
, Yuquilla, × ‡
Rottlera tinctoria, × ‡
, barbata, ‡
, rugosa, ‡
, dicocca, × ‡
, alba, ‡
, pterococca, ‡
, peltata, ×
Govania nivea,
Gelonium fasciculatum, ×
, bifarium, × ‡
, lanceolatum, ‡
Ricinus communis, × ‡
, Mappa,
, dicoccus, ×
Elæococca vernicosa,
Aleurites triloba, ×
, pentaphylla, ‡
Anda Gomesii, ‡
Acalypha indica, ‡
Plukenetia corniculata,
Tragia Chamœlea, ‡
, colorata, ‡
, involucrata, ‡
Sapium indicum, × ‡
, sebiferum, × ‡
, baccatum,
, cordifolium, ×
, lineatum,
Hura crepitans, × ‡
Excœcaria Agallocha, × ‡
Dalechampia madagascariensis,
Euphorbia Antiquorum, × ‡
, hoyifolia, ×
, arborescens,
, lactea, ‡
, trigona, ‡
, neriifolia, ‡
, pyrifolia, ‡
, ligularia, ‡
, Tirucalli, ×
, hirta, ‡
, thymifolia, ‡
, Chamæsyce, ‡
, punicea, ‡
, prunifolia, ‡

### EUPHORBIACEÆ,—Continued.

Euphorbia Bojeri, × ‡
,   terracina, ‡
,   splendens, × ‡
,   jacquiniflora,
Pedilanthus tithymaloides, × ‡
,   carinatus,
Xeroglottis fragrans,
Trewia nudiflora, ‡
,   atroviridis.

### CELASTRINEÆ.

Euonymus garcinifolius, × ‡
,   lanceolatus,
,   scandens, ×
,   bullatus,
,   Hamiltonianus, ×
,   glaber, ×
,   grossus,
Celastrus fascicularris, ×
,   pallidus,
,   montanus, ×
,   oblongus, ×
verticillatus, ‡
,   nutans, × ‡
,   trigynus, ×
,   buxifolius,
,   stylosus, ×
,   rufus, ×
,   multiflorus, ‡
Elæodendron orientale,
,   glaucum, × ‡
Hippocratea indica, × ‡
,   obtusifolia, × ‡
,   arborea, ×
,   viminea, ×
,   sp.
Salacia longifolia, × ‡
,   prinoides, × ‡
,   acuminata, ‡
,   Roxburghii, ‡
,   celastrifolia.

### STAPHYLEACEÆ.

Dalrymplea pomifera, ×

### MALPIGHIACEÆ.

Malpighia coccifera, ‡
punicifolia, × ‡

### MALPIGHIACEÆ,—Continued.

Byrsonima lucida, × ‡
,   pulcherrima, ‡
Hiptage racemosa, × ‡
,   obtusifolia, × ‡
Thryallis brachystachys,
Gaudichaudia granitica, ×
Hiræa nutans, × ‡
,   hirsuta, × ‡
,   napalensis, × ‡
Banisteria laurifolia,
Heteropteris argentea,
Stigmaphyllon aristatum,
Erythroxylum monogynum, ×
,   longifolium,
,   hypericifolium, ×
,   buxifolium,
,   laurifolium,
,   lancifolium.

### PORTULACEÆ.

Portulaca oleracea, ‡
,   meridiana, ‡
,   pilosa, ‡
,   Caffra,
Talinum patens. ‡

### CARYOPHYLLEÆ.

Dianthus Caryophyllus,
,   paniculatus,
,   suaveolens,
,   chinensis, ‡
,   petræus,
,   barbatus,
,   superbus,
,   Plumieri,
Saponaria officinalis, ‡
Stellaria triandra.

### ILLECEBREÆ.

Pharnaceum Mollugo, ‡
,   pentagynum, ‡
Mollugo Spergula, ‡

### TAMARISCINEÆ.

Tamarix indica,
,   dioica, ×

### OCHNACEÆ.

Ochna squarrosa, × ‡
, stipulacea, ×
Gomphia angustifolia,

### SIMARUBEÆ.

Quassia amara,
Samadera indica.

### RUTACEÆ.

Ruta graveolens, ×
, albiflora, ‡
Cyminosma Reevesii, ‡
, pedunculatum, ‡

### ZRYGOPHYLLEÆ.

Tribulus lanuginosus, ‡
, cistoides, ‡
Guaiacum officinale, ×

### XANTHOXYLEÆ.

Brucea mollis, ‡
, sumatrana, × ‡
Xanthoxylum undulatum, ×
, Budrunga, × ‡
, nitidum, ×
Toddalia floribunda, ×
, capparidea,
, aculeata, ×
Fagara triphylla,
, australis,
Ailanthus excelsus,
eglandulosus,

### GERANIACEÆ.

Geranium napalense, × ‡
Erodium moschatum, × ‡
Pelargonium cucullatum,
, Radula,
, capitatum,
, obatum,
, Malcolmii, ×
crassipes, ×

### BALSAMINEÆ.

Impatiens Balsamina, ‡
, lævigata, ‡
Hydrocera triflora, ‡

### TROPAEOLEÆ.

Tropæolum pentaphyllum,
, majus.

### OXALIDEÆ,

Averrhoa Carambola, × ‡
, Bilimbi, × ‡
Oxalis corniculata, ‡
, sensitiva, ‡
, Deppei,
, cafrina,
, cernua,
, variabilis v. albiflora.

### CORIARIEÆ.

Coriaria nepalansis. ‡

### ROSACEÆ.

Rosa multiflora, ×
, indica,
, rubiginosa,
, centifolia,
, chinensis, ‡
, semperflorens, ×
, caroliniana,
, glandulifera,
, involucrata, × ‡
, microphylla,
, procumbens, ×
, Bartoniana,
, canina v. borbonica,
Rubus hexagonus,
, albescens,
, rosifolius, ×
, paniculatus, ‡
Fragaria indica, ‡
, vesca, ‡
Agrimonia nepalensis,
Kerria japonica, ×
Spiræa Roxburghii, ×
Cratægus crenulata, ×

### ROSACEÆ,—Continued.

Cratægus glauca,
Raphiolepis indica, ×
Photinia eugenifolia,
, japonica,
, benghalensis, × ‡
Pyrus communis,
, chinensis,
Cotoneaster affinis,
Pygeum acuminatum,
Prunus armeniaca,
, violacea,
, caroliniana,
, Puddum, ×
, triflora,
Amygdalus Persica, 12 var. ‡
Cerasus Jenkinsii. ‡

### LEGUMINOSÆ.

Sophora tomentosa, × ‡
, glauca, × ‡
, occidentalis, × ‡
, japonica, ‡
, Hopeana, ‡
Edwardsia madraspatana, ‡
, grandiflora, ‡
Ormosia dasycarpa, × ‡
Virgilia aurea, ‡
, latifolia, ‡
, sericea, ‡
Crotalaria grandis, ‡
, juncea, ‡
, vasculosa, ‡
, tenuifolia, ‡
, tetragona. ‡
, stricta, ‡
, fulva, ‡
, pulcherrima,
, retusa, ‡
, verrucosa. ‡
, bialata, ‡
, cuspidulata, ×
, cytisoides, ‡
, uncinella, ‡
, elliptica; ‡
, laburnifolia, × ‡
, Trifoliastrum,
, violacea, ‡
, pulchella, ‡

### LEGUMINOSÆ,—Continued.

Crotalaria capensis, ‡
, quinquefolia, ‡
, incana, ‡
, striata, ‡
, Boroni, ‡
, pilosa, ‡
Sytisus Cajan, ‡
Medicago ciliata, ‡
, lapacea, ‡
Trigonella corniculatum, ‡
, Fænum Grœcum, ‡
Trifolium indicum, ‡
, officinale, ‡
Lotus jacobæus, ‡
, cyathiferus,
, corniculatus, ‡
Psoralea corylifolia, ‡
, speciosa, ‡
Indigofera linifolia, ‡
, ornata, ‡
, Brunoniana,
, polygonata, ‡
, argentea, ‡
, fragrans, ×
, heterantha, ×
, hirsuta, ‡
, viscosa, ‡
, tinctoria, ×
, atropurpurea, × ‡
, virgata, × ‡
, violacea × ‡
, sp. ×
Clitorea Ternatea, × ‡
, brasiliensis, × ‡
, Plumieri, ×
Galactia erecta, ‡
Pueraria tuberosa, × ‡
Glycine debilis, ‡
, involucrata, × ‡
, labialis, ‡
, pentandra, × ‡
, Wightii, ‡
, Backhousiana,
Wisteria sinensis,
Galega pentaptera, ‡
, villosa, ‡
Tephrosia coccinea, ‡
, urophylla, ‡
, tinctoria, ‡

LEGUMINOSÆ,—Continued.

Tephrosia amœna, ‡
, purpurea, ‡
Amorpha fruticosa, ‡
, herbacea,
Robinia suberosa, ‡
, candida, × ‡
, tinctoria, ‡
, racemosa, × ‡
, fruticosa, × ‡
, macrophylla, × ‡
, pulchella, ×
Robinia paniculata, ‡
, Pseudacacia, ‡
, sp.
Agati grandiflora,
Ormocarpum sennoides, ‡
Æschynomene Sesban, ‡
, cannabina, ‡
, procumbens, ‡
, uliginosa, ‡
, aspera, ‡
, scabra, ‡
, paludosa, ‡
, spinosa,
Smithia sensitiva, ‡
Lourea Vespertilionis, ‡
Uraria retrofracta, ‡
, cordata, × ‡
, campanulata, × ‡
, floribunda, ‡
, hamosa, ‡
, crinita, ‡
Desmodium purpureum, ‡
, paniculatum, × ‡
, gyroides, × ‡
, ancistrocarpum, ×
Dicerma pulchellum, × ‡
Pseudarthria viscida, × ‡
Hedysarum Alhaji, ‡
, virginale, ‡
, barbatum, ‡
, amœnum, ‡
, triquetrum, ‡
, alatum, × ‡
, gangiticum, ‡
, latifolium, × ‡
, gyrans, × ‡
, movens, ‡
, bisputorianum, ‡

LEGUMINOSÆ,—Continued.

Hedysarum diphyllum, ‡
, triflorum, ‡
, reptans, ‡
, lycopodioides, ‡
, formosum, ‡
, cephalotes, ‡
, pulchellum, ‡
, Gentium, ‡
, guaroides, ‡
, nutans, ‡
, pictum, ‡
, umbellatum, ‡
, lagenarium, ‡
, pendulum, ‡
Flemingia Chapar, × ‡
, nana, × ‡
, congesta, × ‡
, stricta, ‡
, semialata, × ‡
, strobilifera, × ‡
Cicer Lens, ‡
, arietinum, ‡
Vicia sativa, ‡
Pisum sativum, ‡
Lathyrus Aphaca, ‡
, sativus, ‡
Abrus precatorius, × ‡
Kennedya monophylla,
Phaseolus fuscus, ‡
, alatus, ‡
, sublobatus, ‡
, calcaratus, ‡
, lunatus, ‡
, radiatus, ‡
, psoraleoides, ‡
, Max, ‡
, Mungo, ‡
, aureus,
, trilobus, ‡
Rhynchosia minima, ‡
Canavalia gladiata, × ‡
, virosa, × ‡
Dolichos speciosus, ‡
, rotundifolius, ‡
, Catjang, ‡
, tetragonolobus, ‡
, lignosus 7 var. ‡
, incanus, ‡
, gangeticus, ‡

LEGUMINOSÆ,—Continued.

Dolichos glutinosus, ‡
, brachystachys, ‡
, mollissimus, ‡
, scarabæoides, ‡
, ferreoloides, ‡
, vexillatus, ‡
Mucuna pruriens, ‡
, utilis, ‡
Carpopogon niveus, ‡
, giganteus, ‡
, bracteatus, ‡
, anguinus, ‡
Cylista scariosa, × ‡
Erythrina indica, × ‡
, stricta, ‡
, ovalifolia, ‡
, suberosa, ‡
, arborescens, × ‡
, herbacea, × ‡
, glauca, × ‡
, caffra, × ‡
, sp.
Butea parviflora, × ‡
, superba, × ‡
, frondosa, × ‡
, tetraptera, ‡
Pongamia glabra, × ‡
, heterocarpa, ‡
, sericea, × ‡
, scrassifolia, ‡
, multijuga, ‡
, uliginosa, ‡
, ferruginea, × ‡
Galedupa elliptica, × ‡
, marginata, ‡
Dalbergia oojeinensis, × ‡
, latifolia, × ‡
, glauca, ‡
, Sissoo, × ‡
, frondosa, × ‡
, paniculata, ‡
, zeylanica, ‡
, robusta, × ‡
, marginata, × ‡
, scandens, × ‡
, tamarindifolia,
, rimosa, × ‡
, spinosa,
, sympathetica, ×

LEGUMINOSÆ,—Continued.

Dalbergia sp.
Pterocarpus santalinus,
, Marsupium, × ‡
, dalbergioides, × ‡
, indicus, × ‡
Arachis hypogœa, ‡
Gleditschia triacantha, × ‡
Gymnocladus canadensis, ×
Guilandina Bonduc, × ‡
, Bonduccella, ‡
Cæsalpinia Sappan, × ‡
, digyna, ×
, cucullata, × ‡
, mimosoides, ×
, sepiaria, × ‡
, paniculata, × ‡
, chinensis,
, tortuosa, × ‡
, Coriaria, × ‡
, punctata,
, sp.
Poinciana pulcherrima, × ‡
, Gilliesii, ‡
, elata, × ‡
, regia, × ‡
Parkinsonia aculeata, ‡
Ceratonia Siliqua, ×
Hæmatoxylum campechianum, ×
Hardwickia binata, ×
, pinnata, ‡
Jonesia Asoca, × ‡
Colvillea racemosa,
Amherstia nobilis,
Tamarindus indica, × ‡
, occidentalis, ‡
Cassia attenuata, ‡
, baccillaris, ‡
, Tora, ‡
, bicapsularis, ‡
, purpurea, ‡
, occidentalis, ‡
, Fistula, × ‡
, lanceolata, ‡
, Sophora, ‡
, florida, × ‡
, nodosa, × ‡
, auriculata, ×
, javanica, × ‡
, alata, ‡

LEGUMINOSÆ,—Continued.

Cassia marginata, × ‡
, glauca, × ‡
, marylandica, ‡
, brasiliana, × ‡
, Chamæcrista, ‡
, dimidiata, ‡
, hirsuta, × ‡
, biflora, × ‡
, Wightiana, ‡
, palmistipula, × ‡
, fulgens, × ‡
Schotia speciosa,
, latifolia,
Cynometra polyandra, × ‡
, cauliflora, ‡
Outea bijuga, × ‡
Hymenœa Courbaril, × ‡
, verrucosa, ‡
Bauhinia Richardiana, × ‡
, variegata, ‡
, emarginata, × ‡
, candida, ‡
, purpurea, × ‡
, triandra, × ‡
, parviflora, ‡
, microphylla, × ‡
, porrecta, × ‡
, Vahlii, × ‡
, acuminata, ‡
, tomentosa, × ‡
, anguina, × ‡
, corymbosa, ×
, semibifida,
, malabarica,
, Lingua, × ‡
, brachycarpa, × ‡
, polycarpa, × ‡
, diphylla, × ‡
, piperifolia, ×
, aurantiacea,
, madagascariensis,
, speciosa, × ‡
Cercis Siliquastrum,
Castanospermum australe,
Entada madagascariensis,
, Pursaetha, × ‡
, polystachya, × ‡
, pudica, × ‡
, octandra, × ‡

LEGUMINOSÆ,—Continued.

Entada Intsia, × ‡
, sensitiva, × ‡
, asperata, × ‡
Gagnebina Richardiana,
Parkia Brunonis, × ‡
, biglandulosa, × ‡
Inga Xylocarpa, ‡
, bigemina, × ‡
, Unguis Cati, × ‡
, dulcis, × ‡
, latifolia,
, Harrisii,
, umbrosa, × ‡
, umbellata, × ‡
, ps. indeterm: 3,
Darlingtonia brachyloba,
Desmanthus triqueter, ‡
, natans, ‡
, punctatus, ‡
Adenanthera pavonina, × ‡
, falcata, × ‡
Prosops spicigera, × ‡
Acacia mollis, ‡
, Sirissa, × ‡
, speciosa, ‡
, odoratissima, ‡ ‡
, elata, × ‡
, Wightii, ‡
, Suma, ‡
, amara, ‡
, Smithiana, × ‡
, Careyana, ‡
, stipulata, × ‡
, myriophylla, ‡
, Arabica, × ‡,
, leucophlæa, × ‡
, tomentosa, ‡
, dumosa, ‡
, ferruginea, ‡
, Catechu, × ‡
, Sundra, × ‡
, gluca, × ‡
, aspera, ‡
, rugata, × ‡
, diluta, × ‡
, pennata, × ‡
, caesia, ‡
Dichrostachys cinerea, × ‡
Vachellia farnesiana, × ‡

### LEGUMINOSÆ,—Continued.

Leguminosæ indeterm : 2

### CONNARACEÆ.

Connarus nitidus, × ‡
, ignius.
, sp.
, sp.
Cnestis monadelpha. ‡

### CHRYSOBALANEÆ.

Chrysobalanus Icaco, × ‡
Parinarium Matoma,
, Porterianum,
Prinsepia utilis. ×

### CALYCANTHEÆ.

Calycanthus florida, ×
, præcox.

### SAXIFRAGEÆ.

Hydrangea mutabilis,
Saxifraga ligulata.

### CRASSULACEÆ.

Kalanchoe teretifolia, × ‡
, laciniata, × ‡
, spathulata, × ‡
, virens, × ‡
Bryophyllum calycinum, × ‡
Sedum cuneatum,
, oxyphyllum.

### AMYRIDEÆ.

Amyris punctata, × ‡
Sabia lanceolata,
, limonifolia. ×

### ANACARDIACEÆ.

Anacardium occidentale, × ‡
Semecarpus Anacardium, × ‡
humilis, × ,
Cassuvium,

### ANACARDIACEÆ,—Continued.

Semecarpus cuneifolia, × ‡
, acuminata, × ‡
Holigarna racemosa,
Mangifera indica, × ‡
, acuminata,
, oppositifolia, × ‡
, sylvatica,
Buchanania latifolia,
, angustifolia,
Melanorrhœa usitata, × ‡
Pistacia Lentiscus,
Rhus Toxicodendron, ×
, vernix, ×
, Buckiamela, × ‡
, juglandifolia, ‡
, lucida,
, parviflora,
, paniculata, ‡
, zangibariensis, ×
, mysorensis,
, sp.
Phlebochiton extensus, × ‡
Odina Wodier, ‡
Schinus terebinthifolius. ×

### CUPULIFERÆ.

Quercus Ægilops,
, virens,
Castanea indica, ×
, tribuloides.

### SCEPACEÆ.

Lepidostachys Roxburghii. ×

### URTICEÆ.

Urtica scabrella, × ‡
, smilacifolia, ×
, subperforata, ×
, alienata, ×
, tuberosa, × ‡
, pentandra, ‡
, interrupta, ×
, coronulata,
, involucrata, ‡
, tenacissima, ‡
, naucleiflora, ×

### URTICEÆ,—Continued.

Urtica hastilis,
, biloba,
, photeinophylla,
, nivea, ×
, macrostachya, × ‡
Bœhmeria viminea, ×
Procris punctata,
Canabis sativa, ‡
Antiaris toxicaria,
Morus indica,
, lævigata,
, nigra,
, difaria,
, atropurpurea, ‡
, rubra,
, indica v. alva,
, —— v. multicaulis,
, scandens, ×
Broussonetia papyrifera, × ‡
Ampalis madagascariensis, × ‡
Ficus Carica, × ‡
, pilulifera, × ‡
, hirsuta, ‡
, erythropylla,
, biglandulosa,
, virgata, ‡
, bullata, ‡
, hirta, × ‡
, scabrida,
, heterophylla,
, albinervis, ×
, artocarpifolia,
, mangifolia, ×
, auriculata,
, repens,
, elastica, ×
, indica, × ‡
, religiosa, × ‡
, pisifera, × ‡
, cordifolia, × ‡
, infectoria, × ‡
, exelsa, × ‡
, urophylla, × ‡
, laccifera, × ‡
, macrophylla, ‡
, nitida, × ‡
, lanceolaria, × ‡
, glomerata, × ‡
, conglomerata, ‡

### URTICEÆ,—Continued.

Ficus congesta, ‡
, aurantiaca,
, terebrata,
, sp.
Dorstenia Contrayerva, × ‡
Artocarpus incisa,
, integrifolia, × ‡
, Lacusha, × ‡
, Chaplasha, × ‡
, echinata, ‡
, oblonga,
, angustifolia,
Maclura aurantiaca, ×
, Calcar galli, ×
Batis spinosa,
, fruticosa, × ‡
, aurantiaca, × ‡
Brosimum Alicastrum, ×
Galactodendron Humboldtii,
Trophis aspera, × ‡
Urticea indetermis,

### CERATOPHYLLEÆ.

Ceratophyllum verticillatum,

### CELTIDEÆ.

Ulmus virgata,
, integrifolia, ‡
Celtis orientalis, × ‡
, occidentalis, × ‡
, tetrandra, × ‡

### STILAGINEÆ.

Stilago Bunias, × ‡
, diandra, × ‡
, lanceolaria,
, tomentosa, × ‡
Antidesma pubescens, ‡
, rugosum,
, paniculatum, ‡
, macrophyllum, ×
, madagascariense,
Falconera Wallichiana, × ‡

### MYRICEÆ.

Myrica sapida,
Putranjiva Roxburghii, †

### JUGLANDEÆ.

Juglans regia,
, pterococca,

### CASUARINEÆ.

Casuarina muricata, × ‡
, equisetifolia, × ‡

### CHLORANTHEÆ.

Chloranthus erectus, ×
, inconspicuus,

### SAURUREÆ.

Houttuynia cordata,

### PIPERACEÆ.

Piper nigrum, ×
, cuneifolium, ×
, longum, × ‡
, Betel, ‡
, Cubeba.
, magnolifolium, ×
, pereskifolium,
, Chaba, × ‡

### SALICINEÆ.

Salix babylonica, ×
, tetrasperma, ×

### MONIMIACEÆ.

Mithridatea quadrifida,

### SANTALACEÆ.

Santalum album, ‡

### ELÆAGNEÆ.

Elæagnus dulcis, × ‡
, triflorus, ‡
, confertus, × ‡
, ferrugineus, × ‡

### THYMELEÆ.

Daphne viridiflora, × ‡
Linostoma decandrum, ‡
Jenkinsia assamica,

### HERNANDIACEÆ.

Hernandia ovigera, × ‡
Inocarpus edulis, ×

### AQUILARINEÆ.

Aquilaria Agallochum, ×

### PROTEACEÆ.

Grevillea robusta,

### LAURINEÆ.

Cinnamomum caudatum, × ‡
, iners,
, pauciflorum,
, dulce, ×
, glanduliferum, × ‡
, albiflorum, ×
, zeylanicum, × ‡
Camphora officinalis, ‡
Persea gratissima, ‡
Beilschmidtia Roxburghiana, × ‡
Cryptocarya floribunda, × ‡
Laurus nitida, × ‡
, nobilis,
, Parthenoxylon,
, cupularis,
Tetradenia foliosa,
, umbrosa, ×
Tetranthera nitida, ‡
, angustifolia, ‡
, Roxburghii, × ‡
, bifaria, × ‡
, monopetala, ‡
, quadriflora, ‡
, macrophylla, ×
, glauca, ×
Litsæa chinensis, ‡
Ocotea glaucescens, ×
, lanceolaria,
, mollis,
Cassytha filiformis, ‡

### ILLIGEREÆ.

Gyrocarpus Jacquini, × ‡

### NEPENTHEÆ.

Nepenthes distillatoria,

### ARISTOLOCHIÆ.

Aristolochia saccata,
, indica,
, anguicida, ×
, fœtens,
, brasiliensis,
, Clematitis,
, trilobata,
, hyperborea,
, sempervirens,

### AMARANTHACEÆ.

Amaranthus viridis, ‡
, lividus, ‡
, oleraceus, ‡
, gangeticus, ‡
, lanceæfolius, ‡
, atropurpureus, ‡
, melancholicus, ‡
, fasciatus, ‡
, tenuifolius, ‡
, spinosus, ‡
, caudatus, ‡
Celosia argentea, ‡
, cristata, ‡
, cernua, ‡
Achyranthes aspera, ‡
, lappacea, ‡
, alternifolia, ‡
, ferruginea, ‡
, lanata, ‡
, triandra, ‡
Desmochœta velutina, ‡
Deeringia staminea,
celosioides, × ‡

### CHENOPODEÆ.

Spinacia tetrandra, ‡
Beta benghalensis, ‡
Atriplex hortensis, ‡

### CHENOPODEÆ,—Continued.

Chenopodium album, ‡
, ambrosioides, ‡
Basella rubra,
, alba, ‡
, cordifolia, ‡
Boussingaultia baselloides, ×

### TETRAGONIAGEÆ.

Tetragonia extensa, ‡
Sesuvium repens,

### PHYTOLACCEÆ.

Phytolacca acinosa,
Rivina lævis, × ‡

### POLYGONEÆ.

Rumex acutus, ‡
, vesicarius, ‡
, uncinatus, ‡
Coccoloba uvifera, ×
, excoriata, ×
, pubescens,
, macrophylla,
, punctata,
Ceratogonum atriplicifolium, ‡
Polygonum adenotrichum,
, nutans,
, microcephalum, ×
, fagopyrum, ‡
, lanatum, ‡
, repens, ‡
, paludosum, ‡
, tomentosum, ‡
, glabrum, ‡
, tenellum, ‡
, aviculare, ‡
, flaccidum, ‡
, pilosum, ‡

### NYCTAGINEÆ.

Mirabilis Jalapa, × ‡
Pisonia aculeata,
, villosa, ×
, grandis,
, inermis,

### NYCTAGINEAE,—Continued.

Boerhaavia repanda, ‡
, procumbens, ‡
, diffusa, ‡

### MENISPERMEÆ.

Menispermum tomentosum, ×
, hirsutum,
, canadense,
, polycarpon, ‡
, laurifolium, ×
, villosum,
, cocculus, × ‡
Cocculus cordifolius, × ‡
, palmatus, ‡
, verrucosus, × ‡
, suberosus, ‡
, triander, ‡
, calophyllus, × ‡
Tiliacora racemosa, ‡
Clypea Burmanni,
Cissampelos hexandra,
, convolvulacea,
, glabra, ‡
, hernandifolia, × ‡
, mauritiana,

### LARDIZABALEAE.

Stauntonia latifolia,

### BREXIACEAE.

Brexia madagascariensis, × ‡

### ERICINEAE.

Andromeda piperifolia, ‡

### VACCINIEAE.

Thibaudia setigera,
, variegata,
Gaylussacia salicifolia,

### EPACRIDEAE.

Epacris sp.

### PRIMULACEAE.

Anagallis arvensis, ‡

### MYRISINEAE.

Myrsine bifaria, ×
, semiserrata,
, capitellata, × ‡
Ægiceras fragrans,
Ardisia uvigera,
, paniculata, × ‡
, umbellata, × ‡
, humilis, × ‡
, neriifolia, ‡
, colorata, × ‡
, citrifolia, ‡
, pedunculata, × ‡
, floribunda, ‡
, hymenandra,
, solanacea, ‡
Embelia robusta, ×
, nutans, ×
, villosa,
Choripetalum aurantiacum, ×
, Reevesianum, ×
Mæsa indica,
, macrophylla, ×
, ramentacea,
, nemoralis, ×
, Missionis,
Jacquinia ruscifolia,
Theophrasta latifolia,

### SAPOTEAE.

Achras Sapota, × ‡
, Mimusops, ‡
, sessiliflora,
, sp.
Imbricaria borbonica, ‡
Mimusops hexandra, × ‡
, Elengi, × ‡
, Kaki, × ‡
, angustifolia,
, sp.
Bassia latifolia, × ‡
, longifolia, × ‡
, butyracea, ×
Bumelia Sideroxylon,
Chrysophyllum acuminatum, ‡

### SAPOTEAE,—Continued.

Chrysophyllum oblongum,
, macrophyllum,
, Cainito var, ‡
Sideroxylon inerme, ×
, regium,

### EBENACEAE.

Diospyros vaccinioides, ×
, nigricans, × ‡
, Kaki, ‡
, Ebenum,
, melanoxylon,
, tomentosa,
, glutinosa, × ‡
, Sapota, × ‡
, racemosa,
, montana,
, stricta, × ‡
, Chloroxylon,
, grandifolia,
, lanceæfolia, ‡
, cordifolia, × ‡
, calycina,
, ramiflora,
, grata,
Maba buxifolia, × ‡
Mabola discolor, × ‡
Royena pubescens,

### AQUIFOLIACEAE.

Cassine barbata, ‡
, excelsa, ‡
Siphonodon celastrineus,

### CONVOLVULACEAE.

Cuscuta reflexa, ‡
, capitata, ‡
Rivea tiliifolia, ‡
, Bona nox, ‡
, ornata, × ‡
Argyreia floribunda, ‡
, setosa, × ‡
, splendens, ‡
, festiva, × ‡
, aggregata, × ‡
, speciosa, ‡

### CONVOLVULACEAE,—Continued.

Argyreia argentea, ‡
, capitata, × ‡
, cuneata, × ‡
, Wallichii, × ‡
Quamoclit, vulgaris, ‡
, phœnicea, ‡
, coccinea, ‡
Batatas paniculata, ‡
, cissoides, ‡
, edulis, ‡
, stipulacea, ‡
, albo-hirsuta,
Pharbitis purpurea, ‡
, Nim, ‡
, hispida, ‡
Calonyction speciosum, ‡
, muricatum, ‡
, Pes Capræ, ‡
Ipomœa polyanthes, × ‡
, dasysperma, × ‡
, staphylina, ‡
, cymosa, × ‡
, dentata, ‡
, sessilifolia, ‡
, tridentata, ‡
, Turpethum, ‡
, vitifolia, × ‡
, sinuata, ‡
, reptans, ‡
, lactea, × ‡
, Wightii, ‡
, sedifolia, × ‡
, macrorhiza, × ‡
, salicifolia, ‡
, sepiaria, ‡
, cœrulea, ‡
, Pes Tigridis, ‡
, pileata, ‡
, chryseidis, ‡
, bifida, ‡
, Boottii, ‡
, pendula, × ‡
, rubens, × ‡
, straminea, ‡
, tuberosa, ×
, obscura, ×
Jacquemontia hastigera, ‡
Convolvulus fastigiatus, ‡
discolor, ‡

### CONVOLVULACEÆ,—Continued,

Convovulus umbellatus, ‡
, heptophyllus, ‡
, major, ‡
, visidus, ‡
Aniscia Rheedei, ‡
Porana volubilis, × ‡
, paniculata, × ‡
Breweria Roxburghii, × ‡
Evolvulus alsinoides, ‡

### POLEMONIACEAE.

Caldasia heterophylla, ×

### HYDROLEACEAE.

Nama zeylanica, ‡

### LOBELIACEAE.

Lobelia radicans, × ‡
, triangulata, ‡
, Careyana, ‡

### SPHENOCLEACEAE.

Sphenoclea zeylanica, ‡

### SCAEVOLEAE

Scævola Taccada, × ‡

### RUBIACEAE.

Nauclea Cadamba, × ‡
, microcephala,
, macrophylla, ×
, undulata, × ‡
, parvifolia, × ‡
, cordifolia, ‡
Uncaria sessilifructus, ×
Hymenodictyon excelsum,
, thyrsiflorum, ×
Manettia cordifolia, ×
Mussænda frondosa, × ‡
, macrophylla, × ‡
corymbosa, × ‡
Oxyanthus hirsutus,
Stylocoryne Weberi, ×

### RUBIACEÆ,—Continued.

Gardenia florida, × ‡
, carinata,
, coronaria, ‡
, latifolia, × ‡
, arborea,
, lucida, × ‡
, Thunbergii,
, Rothmannia,
, turgida,
, uliginosa, × ‡
, dumetorum, × ‡
, nutans,
, longispina, ‡
, spinosa, ‡
, Randii, ‡
, floribunda,
, densa,
, stricta, ×
, mexicana,
, puberula,
, odorata,
, attenuata,
, coriacea,
Randia cuneata, × ‡
, acuminata, × ‡
, Candolleana,
, decussata, × ‡
Griffithia fragrans,
Petunga racemosa, × ‡
, stricta, ‡
Fernelia buxifolia,
Webera odorata, ×
, attenuata, ×
, coriacea,
, speciosa, ×
Rondeletia tinctoria, ×
, paniculata,
, odorata,
Sipania sp.
Dentella repens, ‡
Oldenlandia alata, ‡
, crystallina,
, biflora, ‡
, triflora, ‡
Orthostemma roseum, ‡
Hamelia patens, ‡
, ventricosa,
, chrysantha,
Morinda tinctoria, ‡

### RUBIACEAE,—Continued.

Morinda bracteata, × ‡
, exserta, ‡
, angustifolia,
, citrifolia,
, vagans,
Vangueria spinosa, ‡
, macrophylla, ‡
, edulis, ‡
Guettarda speciosa,
Spermadictyon azureum, × ‡
, suaveolens, × ‡
Leptodermis lanceolata,
Myonima obovata, × ‡
, multiflora, ×
Lecontea Bojerana,
Pœderia fœtida, × ‡
Canthium parviflorum, × ‡
, recurvum, × ‡
, longifolium,
, angustifolium, ×
, floribundum, × ‡
Chiococca racemosa, ×
Baconia sp.
Ixora coccinea, × ‡
, Bandhuca, × ‡
, lanceolaria, × ‡
, stricta, ×
, longiflora, ‡
, alba,
, cuneifolia, × ‡
, brachiata, × ‡
, parviflora, × ‡
, virgata,
, undulata, × ‡
, villosa, ‡
, acuminata, × ‡
, opaca,
, sessilis,
, rosea, ×
, barbata, ×
, incarnata,
Pavetta indica, × ‡
, tomentosa, × ‡
Coffea arabica, × ‡
, benghalensis, × ‡
, tetrandra, × ‡
Psychotria undata, × ‡
, bicornis, ×
, stipulacea,

### RUBIACEAE,—Coutinued.

, Reevesii, × ‡
, obtusifolia, × ‡
Chazalia borbonica,
Spermacoce teres, ‡
, lævis, ‡
, tenuior, ‡
, scabra, ‡
, hispida, ‡
Knoxia verticillata,
Serissa fœtida, ×
Rubiacea indeterm, ×

### CAPRIFOLIACEAE.

Lonicera chinensis, ×
, confusa, ×
, Leschenaultii, ×
Sambucus rubra,
Viburnum polycarpum,
, punctatum, ×
, adenophyllum, ×
, acuminatum,

### COMPOSITAE.

Sonchus orixensis, ‡
Prenanthes acaulis,
, linifolia,
, procumbens,
Cichorium Intybus, ‡
Scolymus sp. ‡
Hieracium Wallichii,
Carthamus tinctorius, ‡
Carduus lanatus, ‡
, elongatus, ‡
Serratula carthamoides, ‡
, coccinea, × ‡
Cacalia cylindracea, × ‡
, purpurascens, × ‡
, sonchifolia, ‡
, hieracioides, × ‡
, carnosa, × ‡
Centaurea bracteata, ‡
, pratensis, ‡
, nigricans, ‡
, splendens, ‡
Gynura nepalensis, × ‡
, bicolor, × ‡
Notonia grandiflora, ×

### COMPOSITAE,—Continued.

Vernonia bracteolata, ‡
, anthelminthica, ‡
, vagans, × ‡
, bracteata, ‡
Eupatorium Ayer Punna, ×
, divergens, × ‡
, asperum, × ‡
, repandum,
Decaneurum grande, × ‡
Pectis humifusa, ‡
Elephantopus scaber, ‡
Lagascea mollis, ‡
Ageratum cordifolium, ‡
, conyzoides v. mexicana, ‡
, dumosum, × ‡
Aster mutabilis, ‡
, venosus, ‡
, œstivus, ‡
, annuus, ‡
, sp.
Psiadia dentata,
Senecio undulatus,
Erigeron asteroides,
Amphirapis intermedia, ‡
Microglossa sessiliflora, × ‡
Spilanthus annuus, ‡
, oleraceus, ‡
Bidens Wallichii, ‡
Artemisia vulgaris, ‡
, lactiflora, ‡
, grata, ‡
, indica, ‡
, parviflora, ‡
, sp.
Chrysostephium artemisioides,
Gnaphalium strictum, ‡
, depressum, ‡
, alboluteum, ‡
, indicum, ‡
Conyza corymbosa, × ‡
, balsamifera, ‡
, laciniata, ‡
, lacera, ‡
, stricta, ‡
, chinensis, ‡
, Sitta? ‡
Tagetes erecta, ‡
, patula, ‡
Zinnia pauciflora, ‡

### COMPOSITAE,—Continued.

Zinnia multiflora, ‡
, elegans, ‡
Cosmia sulphurea, ‡
, parviflora, ‡
Chrysanthemum indicum, × ‡
, chinense, × ‡
Pyrethrum frutescens, ‡
Eclipta prostrata, ‡
Verbesina calendulacea, ‡
, scandens, × ‡
, sativa, ‡
Synedrella nodiflora, ‡
Helianthus annuus, ‡
, tuberosus, × ‡
, lævis,
Rudbeckia triloba,
Coreopsis tinctoria, ‡
, coronata, ‡
Balbisia elongata, ‡
Calendula officinalis, ‡
Parthenium Hysterophorus, ‡
Sphœranthus mollis, ‡
, indicus, ‡
Hingtsha repens,
Solidago canadensis,
Dahlia variabilis, ×
Achillea nobilis, ×
, macrophylla,
Xanthium indicum, ‡

### DIPSACEAE.

Dipsacus mitis,

### PLANTAGINEAE.

Plantago major, ‡
, attenuata,
, asiatica, ‡
, Ispaghula, ‡

### PLUMBAGINEAE.

Plumbago zeylanica, ×
rosea, ×
capensis,

## CORDIACEAE.

Cordia Myxa, × ‡
, Myxa v. Benthamensis,
, tectonæfolia, ‡
, laithfolia, ‡
, Gerascanthus,
, polygama, ×
, reticulata, × ‡
, Sebestena,
, serrata, ×
, grandis, × ‡
Erycibe paniculata, ×

## EHRETIACEAE.

Ehretia aspera,
, lævis, × ‡
, buxifolia, × ‡
, serrata, ×
, graveolens,
Heliotropium peruvianum, × ‡
, curassavicum, ‡
, indicum, ‡
, parviflorum, ‡

## BORAGINEAE.

Coldenia procumbens, ‡
Echium violaceum, ‡
Lycopsis arvensis,
Trichodesma indicum, ‡
, zeylanicum, ‡
Anchusa italica,
Cynoglossum Falconerianum,

## LABIATAE.

Ocymum villosum, ‡
, sanctum,
, polystachyum, ‡
, caryophyllatum, ‡
, Basilicon, ‡
, gratissimum, ‡
, cristatum, ‡
, thyrsiflorum, ‡
, micranthum, × ‡
Geniosporum strobiliferum, ‡
Orthosiphon incurrus, × ‡
, stamineus, × ‡
Saccostoma articifolium, ‡

## LABIATAE,—Continued.

Plectranthus cordifolius, ‡
, punctatus, × ‡
, rugosus, ‡
, parviflorus, × ‡
Coleus scutellarioides, × ‡
, aromaticus, × ‡
Hyptis suaveolens, ‡
, radiata, × ‡
, corylifolia, ‡
Lavandula Spica, ‡
Pogostemon plectranthoides, × ‡
Dysophylla verticillata, ‡
Colebrookia ternifolia,
, oppositifolia, ×
Mentha verticillata,
, arvensis, ×
, fruticosa,
, crispa,
, lævigata,
, piperita,
, quadrifolia,
, perilloides,
, auricularia,
, viridis, ×
Meriandra benghalensis, ‡
Salvia coccinea, × ‡
, cana, ‡
, splendens, × ‡
Rosmarinus officinalis,
Monarda fistulosa, ×
Origanum Marjorana,
Thymus vulgaris,
, Nepeta,
Hyssopus officinalis,
Melissa officinalis, ×
, repens, ×
Scutellaria discolor, ×
, carnea, ×
Nepeta ciliaris,
Leonurus tartaricus, ‡
Anisomeles disticha, ‡
, ovata, ‡
, malabarica, ×
Stachys sericea, ‡
, lanata, ‡
Betonica incana, ‡
Roylea elegans, ‡
Leucas stelligera, ‡
, polycephala, ‡

### LABIATAE,—Continued.

, linifolia, ‡
, Gerardiana,
, strobilifera, ×
Leonotis nepetifolia,
, zeylanica, ‡
, cephalotes,
, biflora,
, esculenta, ‡
, pilosa,
Holmskioldia sanguinea, ×
Colquhounia coccinea, ×
Gomphostemma parviflorum,
, melissifolium, ×
Ajuga mollissima,
, bracteosa,
Cymaria elongata, × ‡
Labiata Pucha Pat, ×

### VERBENACEAE.

Clerodendrum hastatum, × ‡
, inerme, ×
, fragrans,
, phlomoides, × ‡
, pyramidatum, ‡
, nutans, × ‡
, trichotomum, ‡
, roseum, ×
, vestitum, ×
, infortunatum, ‡
, Kempii, ‡
, strictum, ‡
, ardisifolium, × ‡
, dentatum, ‡
, serratum, × ‡
, herbaceum, ‡
, neriifolium, × ‡
, odoratum, × ‡
, aculeatum, × ‡
, glanduliferum, × ‡
, squamatum, × ‡
Siphonanthus indicus, ‡
Callicarpa incana, × ‡
, purpurea, × ‡
, cana, ‡
, villosa, ‡
, arborea, ‡
, Reevesii, × ‡
, lanceolaria, × ‡

### VERBENACEÆ,—Continued.

Callicarpa acuminata, × ‡
Premna procumbens, ‡
, scandens, × ‡
, esculenta, ‡
, grandifolia, × ‡
, lævis, ×
, serratifolia, ‡
, integrifolia, × ‡
, cordifolia, ‡
, spinosa, × ‡
, herbacea, ‡
Hymenopyramis branchiata,
Vitex trifoliata, × ‡
, Negundo, × ‡
, alata, × ‡
, incisa, × ‡
, arborea, ‡
, Leucoxylon, × ‡
, saligna, × ‡
, heterophylla, × ‡
, Agnus castus,
Congea pentandra, × ‡
, azurea, ×
Symphorema involucratum, ×
Gmelina asiatica, × ‡
, villosa, ‡
, arborea, × ‡
, parvifolia, ‡
Tectona grandis, × ‡
, Hamiltoniana, × ‡
Duranta Plumieri, × ‡
, Ellisii, × ‡
Streptium asperum, ‡
Verbena Aubletia,
, nodiflora, ‡
, jamaicensis, ‡
, bonariensis, ‡
Stachytarpheta mutabilis, ×
, orubica, × ‡
Lantana Selloviana, ×
, trifoliata, ×
, Camara, ×
, nivea v. mutabilis, ×
, canescens,
, aculeata, × ‡

### MYOPORINEÆ.

Myoporum debile, × ‡
, congestum, × ‡.

### PEDALINEÆ.

Martynia diandra, ‡
Sesamum indicum, ‡
, murale, ‡

### BIGNONIACEÆ.

Bignonia stipulata, × ‡
, adenophylla, × ‡
, undulata,
, æquinoctialis, ×
, suaveolens, × ‡
, crispa, ×
, quadrilocularis,
, amœna, × ‡
, longifolia,
, phlomoides,
, xylocarpa, × ‡
, indica, × ‡
, pubescens, ×
, suberosa, × ‡
, venusta, ×
, viridiflora,
, glutinosa,
, multijuga, × ‡
, echinata,
, califlora,
, crucifera,
, gracilis, ×
, pinnatifolia,
, incarnata,
, venusta,
, Cherere ?
, Chambolia ?
, Chelonoides, ‡
, cauliflora,
, sp.
, sp.
Spathodea serrulata, × ‡
, Rheedei, × ‡
, uncinata, ×
Tecoma jasminoides, ×
, grandiflora,
, radicans, ×
, capensis, ×
Catalpa syringæfolia,
Crescentia Cujete, × ‡
, alata,

### GESNERIACEÆ.

Gloxinia speciosa,
, spec. 3, indeterm,
Loxonia alata,
Æschynanthus Roxburghii,

### ACANTHACEÆ.

Thunbergia angulata, ×
, alata, × ‡
, fragrans, × ‡
, grandiflora, × ‡
, coccinea, × ‡
, Hawtayneana, ‡
Nelsonia lamiifolia, × ‡
Hygrophila obovata,
Hemiadelphis polysperma, ‡
Dipteracanthus ciliatus, × ‡
, suffruticosus, ‡
Petalidium bignoniaceum, × ‡
Ruellia suffruticosa, ‡
, linifolia, × ‡
, maculata, ×
, imbricata,
, longifolia, ‡
, ringens, ‡
, triflora, ‡
, hirta,
Strobilanthess cabra, × ‡
, auriculata, × ‡
, callosa, × ‡
, Sabiniana, ×
, elegans,
, lævigata,
Goldfussia anisophylla, ×
, glomerata,
, isophylla, ×
, lamiifolia, ×
Asystasia coromandeliana, × ‡
Barleria polytricha, ‡
, Prionites, × ‡
, hirsuta, × ‡
, buxifolia, ‡
, cristata, × ‡
, dichotoma, × ‡
, cærulea, × ‡
, ciliata, × ‡
Lepidagathis hyalina, × ‡
Blephairs boerhaaviæfolia, × ‡
Acanthus madraspatensis, ‡

### ACANTHACEÆ,—Continued.

Acanthus ilicifolia, ‡
Crossandra infundibuliformis, × ‡
Phlogacanthus thyrsiflorus, × ‡
, asperulus, ×
, curviflorus,
, guttatus, ×
Graptophyllum hortense, × ‡
Adhatoda corynostachya, ‡
, Vasica, ‡
, Betonica, × ‡
, ramosissima, × ‡
Gendarussa ventricosa, × ‡
, decussata × ‡
, Adhatoda, ‡
, Neesiana, ×
, quadrifaria,
, vulgaris,
, furcata, ×
, bifaria, ×
Eranthemum pulchellum, ‡
, crenulatum, ‡
, palatiferum, × ‡
, azureum, ‡
, strictum, × ‡
Justicia Ecbolium, × ‡
, micrantha, × ‡
, repens, ‡
, procumbens, ‡
, pectinata,
, calycotricha, ×
, peruviana,
, bilineata,
, chinensis, ‡
, guttata,
, ventricosa,
Rhinacanthus communis, × ‡
Peristrophe lanceolaria, × ‡
, speciosa, × ‡
, tinctoria, × ‡
Hypoestes purpurea, × ‡
Rhaphidospora glabra, ‡
Andrographis echioides, ‡
, paniculata, × ‡

### LENTIBULARIÆ.

Utricularia stellaria, ‡
, fasciculata, ‡
, biflora, ‡

### OROBANCHEÆ.

Orobanche pedunculata,
, indica, ‡

### SCROPHULARINEÆ.

Verbascum Thapsus, ‡
Celsia coromandeliana, ‡
Angelonia salicarifolia,
Linaria purpurea, ‡
, ramosissima, ‡
Antirrhinum majus, ‡
, rubrum,
, triflorum,
Maurandya antirrhiniifolia, ‡
, Barclayana, ‡
Lophospermum erubescens, ×
Browallia elata, ‡
Franciscea uniflora,
Brunsfelsia undulata, ×
, montana, ‡
, americana,
Pentstemon angustifolium, ×
, campanulatum, ×
Russellia juncea, ×
, floribunda, ×
Stemodia polyantha, ‡
Limnophila orbiculata, ‡
, globosa, ‡
, cruciata, ‡
Mimulus scandens,
Gratiola grandiflora, ‡
, integrifolia, ‡
, lucida, ‡
, veronicæfolia, ‡
, juncea, ‡
, Monniera, ‡
, reptans, ‡
, serrata, ‡
, parviflora, ‡
, hyssopioides, ‡
, racemosa, ‡
Bonnaya reptans, ‡
Limosella diandra, ‡
Buddleia Neemda, ×
, paniculata, ×
, madagascariensis,
, diversifolia, × ‡
Veronica incana,
Scoparia dulcis, ‡

### SCROPHULARINEÆ,—Continued.

Gerardia delphinifolia,
Bartsia coccinea,

### SOLANEÆ.

Capsicum grossum, ‡
, frutescens, ‡
, baccatum, ‡
, purpureum, × ‡
, minimum, ‡
Solanum coriaceum × ‡
, Balbisii,
, pubescens, ‡
, spirale, × ‡
, tuberosum, ‡
, Lycopersicon, ‡
, rubrum, ‡
, nigrum, ‡
, Pseudocopsicum, ‡
, obtusifolium,
, Melongena, ‡
, longum, ‡
, Jacquini, ‡
, hirsutum, ‡
, indicum, ‡
, pentapetaloides, × ‡
, sp.
, sp.
Physalis flexusoa, ‡
, peruviana, ‡
, minima, ‡
Solandra grandiflora, ×
, viridiflora,
Datura Stramonium, ‡
, fastuosa, × ‡
, Metel, ‡
Brugmansia suaveolens, ×
, quadrivalvis, ‡
Nicotiana angustifolia, ‡
, Tabacum,
, glauca,
Hyoscyamus niger, ‡
Nicandra physaloides, ‡
Cestrum fœtidissimum, ‡

### GENTIANEÆ.

Pladera decussata, ‡
Exacum tetragonum,

### GENTIANEÆ,—Continued.

Villarsia cristata, ‡
, indica, ‡

### SPIGELIACEÆ.

Spigelia marilandica,

### APOCYNEÆ.

Echites frutescens, ‡
, caryophyllata, × ‡
, paniculata, × ‡
, macrophylla, × ‡
, cymosa,
, lisianthiflora,
, accuminata, × ‡
Pentalinum suberectum, × ‡
Ichnocarpus frutescens, × ‡
, fragrans, ×
Holarrhena mollissima, ‡
, antidysenterica, × ‡
Beaumontia grandiflora, × ‡
Vallaris dichotoma, × ‡
Parsonsia spiralis, × ‡
Nerium coccineum, × ‡
, piscidium, ‡
, odorum, × ‡
Strophanthus caudatus, × ‡
, dichotomus, ‡
Wrightia tinctoria, ‡
Alstonia scholaris, × ‡
, venenata,
, macrophylla, × ‡
, neriifolia, ×
Vinca rosea, ×
, major, ×
, alba,
Tabernæmontana coronaria, × ‡
, recurva, × ‡
, crispa, ×
, dichotoma, ×
Cameraria oppositifolia,
Plumieria alba, × ‡
, acuminata, ×
Allamanda cathartica, × ‡
Carissa Carandas, × ‡
, ovata, ‡
, chinensis, × ‡
, villosa, × ‡

### APOCYNEÆ,—Continued.

Carissa diffusa, ‡
, indoina ? ‡
Melodinus monogynus, × ‡
Strychnos Nux vomica, × ‡
, Potatorum, × ‡
, colubrina,
, spinosa,
, sp.
Cerbera Odollam, × ‡
, parviflora, ×
, Tanghin,
, fruticosa, ×
, Thevetia, × ‡
, Manghas, × ‡
Rauwolfia canescens, × ‡
Ochrosia borbonica,
Hunteria corymbosa, × ‡
Alyxia stellata, ×
Ophioxylon majus,
, serpentinum, × ‡
Willughbeia edulis, ×
Alafia Thouarsii,
Apocynea indeterm, 1.

### ASCLEPIADEÆ.

Ceropegia elegans, ‡
, ovata, ‡
, lucida, × ‡
, Lushii, × ‡
, Stephanotis, × ‡
, Vicaryi, ‡
Stapelia variegata, ×
, Asterias, ×
, micusta,
, revoluta, ×
Caralluma fimbriata, × ‡
, crenulata, ×
, adscendens, ×
Boucerosia umbellata, ×
Hya Jenkinsii,
, Potsii, ×
, carnosa,
, parasitica,
, viridiflora, × ‡
, mollis,
Tylophora asthmatica, ‡
, tenuissima,
Marsdenia tenacissima, × ‡

### ASCLEPIADEÆ,—Continued.

Marsdenia Genevi, ×
, tinctoria, ×
Pergularia odoratissima, ‡
, minor, ‡
Dischidia benghalensis,
, Rafflesiana,
Gymnema parvifolium, ‡
, acuminatum, ‡
, napalense, ‡
, pubigerum, ‡
Sarcolobus globosus, ‡
, carinatus, ‡
Asclepias tunicata, ‡
, paniculata, ‡
, tenacissima, ‡
, curassavica, ‡
, pseudogratissima, ‡
Calotropis gigantea, ‡
, procera, ‡
Sarcostemma mauritianum,
Holostemma Rheedei,
Dæmia extensa, ‡
Toxocarpus laurifolius,
Streptocaulon Wallichii,
Hemidesmus indicus, ‡
Periploca græca,
Cryptostegia grandiflora, ‡
, madagascariensis.
Cryptolepis elegans, ‡
, reticulata, ‡
Myriopteron paniculatum, ‡

### POTALIACEÆ.

Fagraea obovata, ×
Gardnera obovata,

### OLEINEÆ.

Olea dioica, ×
, myrtifolia, ×
, capensis, ×
, verrucosa,
, europæa, ×
, fragrans,
, glandulifera,
, attenuata,
, grata, ×
, acuminata,

### OLEINÆ,—Continued.

Olea chrysophylla,
Phillyrea robusta, × ‡
, paniculata, × ‡
Chionanthus macrophyllus, ‡
, dichotomus,
, zeylanicus,
Ligustrum nepalense,
, japonicum, ×
Noronhia emarginata, × ‡
Chondrospermum dentatum, ×
, smilacifolium, × ‡
Fraxinus chinensis, × ‡
, floribunda, ×

### JASMINEÆ.

Jasminum Sambac, × ‡
, scandens,
, pubescens, ‡
, bracteatum, × ‡
, bifarium, ×
, latifolium, × ‡
, aristatum, ×
, arborescens, ×
, angustifolium,
, approximatum,
, trinerve,
, simplicifolium, ×
, laurifolium, ×
, ligustrifolium, ×
, attenuatum,
, heterophyllum,
, auriculatum, ×
, lanceolatum,
, fruticans, ×
, chrysanthum, ×
, grandiflorum, ×
, dispermum, ×
, caudatum, ×
, syringæfolium, ×
, clayeinum, ×
, gracile,
Nyctanthes Arbor-tristis, ×

### GNETACEÆ.

Gnetum Gnemon,
scandens,

### CYCADEÆ.

Zamia spiralis,
, horrida,
, Hilliana,
, pugioniformis,
Cycas revoluta, × ‡
, sphærica, × ‡
, circinalis, ×

### CONIFERÆ.

Pinus longifolia, × ‡
, Deodara,
Agathis loranthifolia, ‡
Araucaria excelsa,
, Cunninghami,
Thuja orientalis, × ‡
, pendula, ×
Cupressus stricta,
, australis,
, sempervirens,
, fastigiatus, ×
, sp.
, sp.
Juniperus cernua,
, dimorpha, ×
, chinensis, ×
, virginiana,
Dacrydium elatum,
Podocarpus chinensis,
, macrophyllus, ×
, elongatus, ×
, cafrinus,
Taxus nucifera,
Salisburia adiantifolia,

### PLANTÆ INCERTÆ SEDIS.

Periplexis rigida, ‡
Sarcostigma Roxburghii, ‡
limonifolium, ‡
sp.

### OMITTED FROM NAIADES.

Spathium undulatum,
, monostachyum.

# Monthly Proceedings of the Society.

*(Wednesday, the 13th December, 1843.)*

The Honorable Sir J. P. Grant, President, in the Chair.

Messrs. G. R. Gordon, Charles Chapman and T. B. Swinhoe, who were proposed at the last Meeting, were duly elected Members of the Society.

George Jephson, Esq. of Calcutta, was proposed as a Member of the Society by Mr. Wm. Storm, seconded by Mr. C. S. Stowell.

*Presentations to the Library.*

1. Lectures on the condition, resources and prospects of British India, by George Thompson. *Presented by Mr. Landers.*
2. Memoranda upon the state of Indian Bazar Weights and Measures. *Presented by the Author, Mr. H. G. Palmer.*
3. The India Journal of Medical and Physical Science, No. XI, of vol. 1. *Presented by the Proprietor.*
4. The Calcutta Literary Gleaner, No. X, of vol. 2. *Presented by the Proprietor.*
5. Liebig's Chemistry of Agriculture and Physiology, (second Edition,) and Falkner's Practical Treatise on the nature and value of Manures. *Purchased by the Society.*

GARDEN.

1. An assortment of English Fruit Trees, consisting of apples, pears, plums, nectarines, peaches, raspberries, currants, gooseberries and vines. *Presented by Capt. E. P. Nisbet, Commander of the Agincourt.*

Capt. Nisbet mentions, that having heard from Dr. Falconer, that the fruit trees he brought out two years ago were succeeding admirably in the Hills, he should prefer these being sent were likely to thrive the best. Capt. Nisbet adds, that the trees are at present in the hands of Dr. Griffith, who has kindly taken charge of them.

The best thanks of the Society were given to Capt. Nisbet, for his handsome contribution. At the request of the meeting, Dr. Griffith agreed to take charge of these plants, with the view of carrying Capt. Nisbet's suggestion into effect.

2. Two boxes of English fruit trees. *Purchased by the Society.* (Further particulars regarding this consignment will be found in the report of the Garden Committee.)

3. A large supply of tulip bulbs, consisting of the Bizard, Rose, Byblœmen, early, double, striped, and other varieties. *Purchased by the Society and received by the Overland Mail.*

It was suggested that a portion of this assortment be presented to Dr. Griffith for trial at the Botanic Garden, and the remainder distributed over Bengal and Upper India. Dr. Griffith kindly consented to carry out this suggestion in all its parts.

### MUSEUM.

1. Samples of Cotton grown at Sydney from American and other foreign varieties of seeds. *Presented by Dr. J. V. Thompson, Deputy Inspector General of Hospitals, at Sydney.*

2. Further samples of Cotton from Dr. Thompson. *Presented by the Government of India.*

3. A supply of Burmah Cotton Seed. *Presented by Joseph Agabeg, Esq.*

4. Sample of Cassia from Assam. *Presented by Dr. Griffith, on behalf of Major Jenkins.*

The Secretary stated that in his note forwarding this cassia, Dr. Griffith mentions, it would be interesting to Major Jenkins if the Society could obtain an opinion regarding its value. He had accordingly taken steps to meet this request, and had now the pleasure to submit two reports with which he had been favored by Messrs. Rennie and Terry. He also begged to read a communication on the same subject from Mr. Landers, who has had practical experience with the article.

It was directed that a copy of the reports be furnished for Major Jenkins' information, and that all the papers be transferred to the Committee of Papers.

5. Sample of soil from the little Constantia Vineyard at the Cape of Good Hope, one of the Estates producing the famous Constantia Wine. *Presented by C. Cardew, Esq.*

6. A small supply of seed of the Dalbergia lanceolaria. *Presented by Mr. John C. Ondatjee, Superintendent of the Royal Botanic Garden at Peradinea, Ceylon.*

Mr. Ondaatjee states that this is a valuble timber tree, and much used in Ceylon, where it is commonly called "Nandu Wood." The seeds were transferred to the Society's garden.

### *Provision for Garden and Flower Seeds for* 1844.

The Secretary informed the meeting, that the time had now arrived for making arrangements for a supply of garden and flower seeds for the next season; it was therefore necessary to determine what amount should be voted for that purpose He begged to mention, that since the last meeting of the Society, a consignment of seeds, to the value of 450 Rs., had been received from America. This consignment having reached so late, the Kitchen Garden Committee,—whose remarks on the subject he begged to submit,—had agreed to reserve the seeds for transmission to distant Members in the early part of next year. From an estimate drawn up with reference to the expenditure on this head during the present year, the sum of 3000 Rs. including the 450 Rs. above alluded to, would appear to be sufficient to meet all demands for next season. In advertence to the following extract of a letter lately received from Major Napleton, Secretary of the Bhauglepore Branch Agricultural Society, he would beg to submit, for consideration, whether it would not be desirable to withdraw the amount hitherto voted for flower seeds from the Cape, which have generally proved to be of an inferior description, and appropriate it for a trial assortment from the English seedsmen, recommended by Major Napleton:—

*Extract.*—"Our English Seedsmen, Vetch and Sons, Exeter, Devonshire, have sent us a magnificent batch of Flower and Vegetable seeds, per overland route,—their charges are most reasonable, and their seeds so fresh, that they came up freely the fourth day after sowing,—and I strongly recommend these well-known Seedsmen and Florists to the notice of the Parent Society."

It was proposed by Mr. Staunton, and resolved, that the sum of three thousand Rupees be voted for the purchase of seeds for next season, and that it be referred to the Fruit and Kitchen Garden Committee to make the necessary arrangements, and to determine in regard to the suggestion of a small supply of seeds from England.

### *Horticultural Exhibition and Anniversary Dinner.*

The Secretary next called attention to the amount to be voted for prizes to Native gardeners during the next year; as also to the period when the first exhibition and anniversary dinner should be held. From enquiries made, he had ascertained that, in consequence of the season being an early one, the vegetables would be likely to attain perfection about the middle of January.

Moved by Dr. Griffith, seconded by Mr. William Storm, and resolved, that four hundred Rupees be voted for prizes for the exhibitions of 1844.

Moved by Sir Lawrence Peel, seconded by the Secretary, and resolved, that Saturday, the 13th of January, be the day for the exhibition and dinner.

### *The Metcalfe Hall.*

Mr. Robison informed the meeting that as the Metcalfe Hall was now almost ready for occupation, it was necessary that steps should be taken towards the fitting up, &c. of that portion of the building to be appropriated for the accommodation of the Society, he accordingly begged to move,—

"That a Committee be appointed to inspect the Metcalfe Hall, now approaching completion, for the double purpose of communicating with the Metcalfe Hall Committee, and reporting to the next meeting of this Society, and also for the purpose of examining the portion of the building which belongs to the Society, and reporting what furniture, &c. may be required for it."

The motion was seconded by Mr. Griffith and agreed to.

It was further moved by Mr. Robison, and seconded by Mr. Griffith, and resolved

That the Finance Committee be that Committee, and that the name of Mr. C. K. Robison be added to the Committee.

### *Society's Nursery Garden;—English Fruit Trees;—Cacao Plants;—Sugar cane, &c.*

The paper next submitted was a report from the Garden Committee of a meeting held on the [illegible]h inst. The Committee propose that the Fruit Trees per *Agincourt*, which arrived in excellent condition, should be distributed among the members of the Society who are more particularly interested in this sort of cultivation, and that a selection should be sent to the Branch Garden at Bhauglepore. That of the Cacao plants, which are in excellent condition, two should be presented to the H. C. Botanic Garden, and the remainder planted out in an eligible place with sufficient shade: and that thanks be given to Mr. Ross, Head Gardener of the H. C. Botanic Gardens, for the successful treatment these plants have received at his hands. The Committee suggest, as the means of securing the most profit to the Society, that in consequence of the very limited demand for cane, (two thousand only have been disposed of,) and the limited prices offered for such as were to be disposed of, (about sixteen thousand,) that with the exception of the best *real* Otaheite cane to be kept for stock, the whole of the canes be converted by the overseer into *goor*. The Committee further add some suggestions in regard to the Kitchen Garden Department, and for extending the cultivation of Cuba Tobacco, and reducing that of the Manilla Hemp. The Committee close their report by stating, that the garden is in a satisfactory condition. The report of the Committee, in all its parts, was confirmed.

### *Report on Samples of Wheat from Hoosungabad.*

A report on the samples of Wheat, and other grains, the produce of Hoosungabad, which were transmitted by Colonel Ouseley, and presented at the last meeting, was next read, together with a separate report drawn up by Mr. W. Haworth. Mr. Haworth is of opinion, that of all the varieties, the Sohalya and Pissee wheats are the finest. The Sohalya he considers a suitable wheat for most markets, and is more like English wheat than any of the other samples, expect the Pissee, which, if it could be sent to England in good condition, would be as valuable as the best kinds of English wheat :—it weighs moreover 63lbs. to the bushel.

The best thanks of the Society were directed to be given to Mr. Haworth, for his kindness in drawing up this report. It was also directed that a copy of the report should be furnished to Colonel Ouseley for his information, and transferred to the Committee of Papers.

### *Bhauglepore Branch Agri-Horticultural Society.*

The next communication submitted to the meeting was from Major Napeleton, Secretary of the Bhauglepore Branch Society, transmitting, for the purpose of being laid before the Parent Society, the proceedings of a meeting held at Bhauglepore on the 15th ultimo. Major Napleton also encloses an account of the show of Flowers, Fruits and Vegetables which took place on the evening of the same day, and gives the result of trials on the Flax, Cotton, Tobacco, Barley, &c. seed received from the Parent Society.

Major Napleton adds, " my mode of sowing English seed is as follows : Sow in moderately moist and well prepared ground, cover in the seed slightly with a *coorpee* (weeding knife) and then sprinkle a basket of old ashes over each bed. Irrigate 48 hours after sowing, and again a week afterwards. Under this treatment our overland seeds are bursting forth in great style."

The best acknowledgments of the Society were offered to Major Napleton for his interesting and encouraging report, which, together with his letter, were made over to the Committee of Papers.

### *Prospectus of a Work on the Commercial Products of India.*

The Secretary stated, that he had received by the last mail a letter from Dr. Royle, enclosing some copies of a prospectus of a work on which he is now engaged, on the commercial products of India, and which he hopes will be useful to practical men desiring to become acquainted with the products of India, and the names by which they may be obtained. Dr. Royle states, that these prospectuses are issued for the purpose of collecting information, and all kinds will be gratefully acknowledged.

The work, Dr. Royle adds, will be in parts, the first on Timber trees and Cordage plants.

The Committee of Papers were requested to insert the prospectus in an early number of the Journal, with a view to assist in meeting Dr. Royle's request for information.

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### *Culture of Foreign Cotton at Jessore.*

The Secretary informed the meeting that he had lost no time in distributing the greater portion of the fine supply of acclimated New Orleans and Bourbon Cotton seed, the produce of the Government Cotton farm at Coimbatore, which had been placed at the disposal of the Society, through the kindness of Dr. Wight, in September last. He had now the pleasure to submit, in the following extract of a letter, dated 5th December, with which he had been favored by Mr. A. T. Smith, a member of the Society, residing at Jessore, the first intelligence the Society has received, regarding the result of trials with this seed :—

"All the acclimated New Orleans and Bourbon Cotton seed I received from the Society in the early part of October, was immediately sown, and *not a seed failed;* the plants are now from 6 to 8 inches high, and look very healthy."

Mr. Smith promises to communicate further progress, and to send samples of the Cotton in due course.

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### *Communications on various subjects.*

The following letters and papers were also submitted :—

1.—From T. R. Davidson, Esq., Secretary to Government of India, Home Department, dated 2d December, enclosing copy of a letter from the Secretary to Government N. W. Provinces, with a report from Mr. Blount, Government Cotton planter, regarding the American Cotton cultivation at Goruckpore.

2.—From Dr. J. V. Thompson, Deputy Inspector-General of Hospitals at Sydney, forwarding samples of Cotton of various kinds, the produce of his estate at Sydney.

3.—From T. R. Davidson Esq., Secretary to Government of India, transmitting copy of a letter from Dr. J. V. Thompson, to the address of the Governor General, together with the samples of Cotton therein referred to.

4.—From Capt. G. E. Hollings, Lucknow, dated 26th November, submitting replies from Lucknow and Fyzabad, to queries regarding manures.

5.—From A. H. Landers, Esq., presenting a memorandum on the vegetable and other products of the Shan country, with some accounts of its trade. Mr. Landers mentions that this paper has been compiled from notes which he made during his travels in that country in 1842-43.

6.—From Dr. Royle, giving an account of the successful culture of the Himalyan Onion in England.

The above communications were transferred to the Committee of Papers.

7.—From George Eveleigh, Esq. enclosing extract of a letter to his address from Mr. Borchards, a member of the Agricultural Society of the Cape of Good Hope, and another to the address of the Society from Mr. Van Breda, Secretary of the Cape Society.

Mr. Van Breda acknowledges receipt of the Journals of the Agricultural Society of India, and expresses the thanks of the Cape Society for the same, and their readiness to continue correspondence.

For all the foregoing communications and presentations, the thanks of the Society were accorded.

## *Report of the Agricultural and Horticultural Society of India, for the year* 1843.

Introduction.

In continuation of former Reports, the Society has the pleasure to submit the following outline of its proceedings during 1843:—

Economy of the Society.

The first question of importance relates to the internal economy of the Society. Since the close of 1842, sixty-eight new names have been added to the list, while the loss from deaths and resignations, has been also considerable. There have been fourteen deaths, sixty-six resignations, and two, (Mr. T. J. Bell, and Baboo Keenut Sing,) struck off for non-payment of subscriptions; in all eighty-two. It may be added, that many resignations have taken place in consequence of departure from the country. The distribution of the Members as they now stand, may be referred to the following classes:—

| | | | | | 40. | 41. | 42. | 43. | s T | l re umbe<br>clos 1843,<br>ded g lap |
|---|---|---|---|---|---|---|---|---|---|---|
| Honorary Members,... ... ... ... ... ... | 6 | 1 | 0 | 1 | 0 | 2 | 0 | 1 | 11 | |
| Free Member, ... ... ... ... ... ... ... | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| Civilians in the Service of Government, | 46 | 41 | 11 | 27 | | | 21 | 14 | 200 | 159 |
| Merchants and Traders, . | 31 | 36 | 28 | 15 | | | 18 | 16 | 176 | 125 |
| Indigo and other Tropical Agriculturists, | 25 | 21 | 43 | 23 | | 21 | 7 | 15 | 182 | 96 |
| Military Officers, ... ... ... ... ... ... | 34 | 17 | 18 | 15 | 18 | | 4 | 16 | 143 | 98 |
| Medical Ditto, ... ... ... ... ... ... ... | 14 | 16 | 10 | 7 | 7 | 10 | 9 | 1 | 74 | 36 |
| Asiatics, ... ... ... ... ... ... ... ... | 13 | | 7 | 1 | | 8 | 6 | 5 | 56 | 42 |
| Clergy, ... ... ... ... ... ... ... ... | | 2 | 2 | 1 | 0 | 1 | 1 | 1 | 13 | 4 |
| Law Officers, ... ... ... ... ... ... ... | 14 | 5 | 1 | 5 | 3 | 0 | 6 | 2 | 36 | 24 |
| Miscellaneous, ... ... ... ... ... ... ... | 0 | 0 | 3 | 0 | 2 | 0 | | 0 | 7 | 7 |
| | 188 | 148 | 123 | 95 | 110 | 95 | | 68 | 905 | |

If from this return of six hundred and one members, thirty-nine who have compounded for their subscriptions be deducted, with nine honorary members, one hundred and nine absentees in Europe, and one free member, there will remain four hundred and forty-three as the actual number of *paying* members now on the strength of the Society.

Necrology.

The following are the members who have been taken away from the Society by death during the past year:—The Honorable J. Stewart Mackenzie, late Governor of Ceylon, (an honorary member;) Colonel Charles Poole, Commanding at Chunar; Mr. T. H. Gardiner, Merchant, of Calcutta; Dr. Voigt, Surgeon of His Danish Majesty's settlement at Serampore; Mr. James Colquhoun, Merchant, of Calcutta; Rajah Khan Bahadoor of Gya; Mr.

Harris, Indigo Planter; Major DeBude, Secretary to the Military Board, Calcutta; Mr. James Curtis, Indigo planter; Mr. W. H. Stacy, Merchant, Calcutta; Mr. Andrew Laidlay, Indigo planter; Mr. R. Vaughan, of the Supreme Court; Mr. R. S. Maling, Superintendent of Salt works at Bagundee; and Mr. Wm. Sinclair, Indigo planter at Malda.

Indian Wheat question.

Among other topics which have engaged the attention of the Society during the year, that relative to the admission of Indian wheats into British ports, at a more favourable rate of duty than now obtains, may be considered as of the first importance, and is therefore primarily alluded to, although it did not come under discussion earlier than at the meeting in May. As the merits of the question are fully dwelt on in the proceedings for that month, it is unnecessary in this place to do more than mention what steps have been taken towards the carrying out, in some measure, of the intentions of the Society as incorporated in the following motion: "That a Committee be appointed to enquire into the capabilities and advantages of giving encouragement to the export of wheat from this country; and to report upon the expediency of our expressing our gratitude, as an Indian Public Society, to the Court of Directors, for pressing on the Home Government the important measure of the admission of Indian wheat into British ports, and at the same time expressing our earnest support to the measure, as one calculated to benefit and advance the interests of India."

The Committee thus formed, submitted at the following meeting in June, a Report of the proceedings of their preliminary meeting, in which they recommend, as a first step, the circulation of queries over different parts of the country, with a view to obtain as much information as possible on all points connected with the subject of, their enquiry. This report was adopted, and no time was lost in giving effect to the suggestion. Here for a time the labours of the Committee ceased. At the October meeting, a memorandum was submitted, by a member of the Committee, urging that the matter be brought to a close as speedily as possible;—whereupon it was resolved, to refer the question again to the Committee. At the next meeting in November, the Committee informed the Society, that the information on hand was not sufficient to admit of their drawing up a full report, but suggested that a second application be made to those who had not complied with the requests contained in the first circular. This was agreed to, and carried into effect. Since then, several communications have been received, and the Committee hope to submit the result of their enquiries, in the early part of next year.

Change in the Horticultural Exhibitions.

The propriety of making some alteration in the mode formerly adopted for encouraging improvement in the growth of vegetables and fruits, was brought under the consideration of the Society in the early part of the year. The subject underwent discussion at the meeting in February, on the submission of a list of money prizes and medals which were awarded at the annual exhibition in January, and it resulted in the formation of a Committee, under the designation of the "Fruit and Kitchen Garden Committee." This Committee gave in their report at the April meeting, in which, among other suggestions, they recommend that in lieu of an annual show, quarterly exhibitions be held in future. This suggestion was deemed a very desirable one, but it was not considered necessary to carry it fully into effect till next year. In the meantime it was agreed, that another exhibition should be held in October. This took place accordingly, and was considered a satisfactory commencement of the change from an annual to quarterly exhibitions.

Medals awarded by the Society for Cattle.

In the department of rewards, the Society has to report, in addition to the above-mentioned, the adjudication of the following medals at the annual exhibition of cattle, held on the 1st of February :—

To Dr. Huffnagle, for the best imported cow of any denomination, the silver medal.

To Dr. Huffnagle, for the best cross, the produce of an imported bull or cow with native stock, the gold medal.

To Dr. Huffnagle, for the best bull calf of any denomination, calved in 1842, the gold medal.

To Mr. J. Wallace, for the best cow calf of any denomination, calved in 1842, the silver medal.

Withdrawal of Prizes for Cattle after 1844.

At the March Meeting, the President called the attention of the Society to the limited result which had attended the offer of prizes for improving the breed of cattle in India, notwithstanding that a period of five years had elapsed since the first exhibition had taken place, during which time a sum equal to 4,000 Rupees had been expended for money prizes, and for gold and silver medals. The subject was referred to the Committee, who, at the following meeting in April, submitted their report to the effect, "that the attempt to improve cattle and sheep by money premiums and medals, has not held out sufficient encouragement, in the number of cattle brought forward at the shows, to induce a continuance of the annual exhibitions ; and they consequently deem it advisable to recommend that such premiums for public competition be withdrawn, after the expiration of another year, to which period the engagements of the Society extend." This report was confirmed, and the exhibitions will accordingly cease after February 1844.

Formation of Agricultural Societies.

In the last Annual Report, allusion was made to the formation of an Agricultural Association at Ceylon. The Society has the further gratification of announcing the establishment of three similar Institutions during the present year; viz. at Agra, at Bhauglepore, and at Moulmein; the two latter being branches of this Society.

At Agra.

The Agra Society was formed in the middle of the year, and a report of its proceedings is promised so soon as the first half yearly meeting has taken place.

At Moulmein.

The Moulmein Society came into existence at the close of the year, and consequently is not sufficiently matured to admit of any report of progress.

At Bhauglepore.

From the Society at Bhauglepore, several gratifying communications have been received, and published in the Journal of the Parent Society. Although established only eight months, this promising Society already numbers 111 members. Several exhibitions to promote the improved culture of vegetables, fruits, &c. have been held, and a large piece of ground has been converted into an useful and ornamental garden. It is to the indefatigable exertions of its Secretary, Major Napleton, that this Branch Society is indebted for its rapid rise and present prosperity. The usual amount of fifty Rupees and two silver medals, voted to all its branches, has been awarded by the Parent Society to this Institution, besides a large supply of seeds of all sorts, and an assortment of English fruit trees.

Public Garden at Lucknow.

In addition to the above, the Society has received several communications from Captain G. E. Hollings, regarding the Garden of the Branch Society at Lucknow. This garden is in a very flourishing condition, owing to the great care and attention which Captain Hollings has bestowed on it.

Dissolution of the Allahabad Agri-Horticultural Society.

The Society has received intimation during the year of the dissolution of the Allahabad Agricultural Society. This has been brought about in consequence of the decrease in the number of its members, and the removal of the Sudder Court and Board to Agra. The Society have transferred their stock, &c. to the Magistrate and Collector of Allahabad, to be applied, as far as practicable, to carry out the original object of the Society.

Culture of Flax, Hemp, and Coffee at Chittagong.

The measures which have been adopted to improve the growth and manufacture of hemp and flax at Chittagong, and to introduce the cultivation of coffee, have been brought to the notice of the Society during the year, by Mr. Sconce, the Collector of the province. With a view to establish the culture of the latter staple, a Joint Stock Company has been formed, at the recommendation of Mr. Sconce. This gentleman has also forwarded to the Society, samples of flax and hemp, the produce of foreign and country seed, and the quality was considered so good, as to induce the Society, at the suggestion of its Committee, to appropriate the sum of two hundred Rupees for prizes to be awarded next year, for the best cultivated five beeghas of hemp and flax, and for the best five maunds of both articles in a manufactured state. The Society has further placed at the disposal of Mr. Sconce, a set of the necessary improved implements for dressing flax and hemp. The Report of the Committee and all other particulars will be found in the second number of the Journal. The Society hope to have a further and fuller account next year, of the result of these experiments.

Bust to the Memory of the Founder of the Society.

It was mentioned at the close of the last report, that a Subscription had been commenced for the purpose of procuring a marble bust, of the late Rev. Dr. William Carey, to be placed in the new apartments at the Metcalfe Hall. The Society has now the pleasure to add, that a total sum of £155 has been raised for this object. Professor Royle has been solicited to make the necessary arrangements for carrying the wishes of the Society into effect, and a bill for £120 has been remitted to him for that purpose.

The Metcalfe Hall.

In the Report for 1840, full particulars will be found regarding the preliminary arrangements for the erection of the Metcalfe Hall, in the lower story of which building the business of the Society is to be hereafter conducted. The Society has now to mention, that the building is rapidly approaching completion, and will, it is hoped, be fit for occupancy in the early part of next year. As the Society possesses so great an interest in this handsome edifice, towards which it has subscribed a sum exceeding sixteen thousand Rupees, it is considered that the following description of the building will not only serve as a record, but be likewise acceptable to the Members of the Society:—

Description of the Building.

"It is raised on a solid but ornamental basement of ten feet in height, and extends a hundred and fifty feet in length, and a hundred in breadth. The order of Architecture is from the Portico of the Temple, or Tower of the Winds, at Athens. The completion or roof is taken from the Choragic Monument of Thrasyllus, also at Athens. The front of the building, as seen from the Strand, presents to view a broad flight of steps, sixteen in number, and sixty-five feet long, leading to the portico or colonnade. On the opposite side there is a covered colonnaded entrance, with a similar flight of steps, which lead up to the lobby and internal stair case. The columns and colonnade nearly surround the whole building; the former, which are thirty in number, and thirty-six feet high, rise from the basement; and the entablature being carried all round, gives the building externally, the appearance of a Grecian Temple of one lofty story. Internally, however, there are two stories. The first floor is to be occupied by the Agricultural and Horticultural Society, and consists of a hall, 63 feet by 30; a seed and specimen room, 36 feet by 24; a museum or room for models of Agricultural and Horticultural implements, 36 feet by 24; a lobby also 36 by 24; a Secretary's room, 24 feet square; and a corridore, or passage, leading to the main hall, 36 by 12 feet. All these rooms are 22 feet high in the roof. The upper story is to be occupied by the Calcutta Public Library, and communicates with the lower one by a handsome teak wood stair, 7 feet in width. In the interior of the building, a conspicuous place will be allotted for the reception of a bust of Sir Charles Metcalfe."

Government withdrawal of Free Postage.

In the last Annual Report allusion was made to the withdrawal by Government, of free postage on all communications addressed to or by the Society, and fears were entertained that the deprivation of this privilege, after its enjoyment for so many years, would affect, in a measure, the usefulness of the Institution. So general was this opinion, that at the particular request of the Society, the President addressed, in the early part of the year, His Honor the Vice President in Council, *a second time* on the subject, pointing out "that an expence of certainly not less than Rupees 1,000 per annum is for all future years deducted from the funds to be devoted to its legitimate object, the improvement of the produce of the soil, from which, by a direct taxation, the whole of the revenues of the Government are derived, and that the transmission of agricultural seeds to the interior of the country will be greatly curtailed, if not, as is most probable, nearly put an end to."

Unsuccessful result of a second appeal on the subject of the withdrawal of Free Postage.

The Society much regrets to add, that this appeal was equally as unsuccessful as the former; for the Secretary to the Government of India, in his reply states, that "His Honor in Council regrets, that consistently with the just demands of the state, he cannot alter the orders already passed on the subject." The experience of the past twelve months has proved, that the apprehensions referred to in the last Report, are not groundless, for the Society has not had it in its power to despatch more than half the quantity of useful seeds which were distributed over the country during 1842.

Prosposed grant by the Honorable the Court of Directors of free transmission of seeds by the overland route.

But while it is obliged to allude to the unfortunate result of its application in the above matter, the Society would also acknowledge, with thanks, the proposed compliance, in part, by the Hon'ble the Court of Directors, of the request which it preferred in 1841, for permission to receive its supply of seeds from England, free of charge, by the Mediterranean and Red Sea Steamers. The Court intimate, that although the bulk of supplies of seeds required by the Society is far too great to admit of their being forwarded by the Steamers via Bombay, and across the Continent of India to Calcutta : yet " they will be disposed to meet the wishes of the Society to, a certain extent, when the direct communication between Suez and Calcutta, by steam, is effected, and shall take opportunities of sending occasional supplies of such seeds as are deemed of importance, by the most speedy conveyance. "

Agricultural Department.

Although, from the circumstance previously alluded to, so much has not been effected during the year as could be wished, yet the Society has not been idle in the distribution of agricultural seeds, whenever favorable opportunities have been presented.

Foreign and Acclimated Cotton Seeds.

Through the kindness of its members, supplies of cotton seed have been placed at the disposal of the Society, and by this has been obviated the necessity of any call on its funds on this account. Dr. Huffnagle, an honorary member, to whom the Society is much indebted for former gifts of a similar nature, has again most handsomely presented a quantity of Tenessee Cotton seed. Dr. Wight, Superintendent of the Government Cotton Plantations at Coimbatore, has likewise transmitted a fine supply of acclimated New Orleans and Bourbon seed, the greater portion of which has been distributed. At the considerate recommendation of this gentleman, the Government of Madras has also been pleased to forward to the Society several casks of imported Upland Georgia and Sea Island seed. Mr. Joseph Agabeg, of Calcutta, has likewise favored the Society with a supply of cotton seed from Burmah.

Carolina Paddy.

In consequence of the many demands for Carolina paddy, the Society has ordered, through the friendly agency of Messrs. Haworth and Hardman of this city, a consignment of seed, which is likely to reach in March or April of next year.

Flax and Hemp Seed, Europe Wheat and Barley.

Small supplies of seed of foreign hemp, flax and wheat have likewise been procured and distributed. The accounts regarding the two former are not favourable; of the latter no tidings have as yet been received, but the Society hope to obtain some information of the result of trials in due course..

Cacao Plants.

Attempts have also been made to procure pods of the superior description of Cacao from the West Indies, and this is likely to be attained through the kindness of Professor Royle. The Society is likewise indebted to the East India and China Association, and its Secretary, Mr. Stikeman, for their ready compliance with its requests in this matter; also to Captain Marquard, for having generously placed at its disposal several plants, the produce of his garden at Chittagong. Here it may not be out of place to mention, that a few plants were received some time ago by the Society from the Straits, and have now become very healthy specimens from the successful treatment experienced at the hands of Mr. Ross, Head Gardener of the H. C. Botanic Garden.

Horticultural Dept. Garden and Flower Seeds.

In the Horticultural Department, seeds have been imported from America and the Cape of Good Hope. In consequence of the very limited variety of flower seeds supplied by the seedsmen at the latter place, it has been determined to appropriate the sum of £40 for a supply of flower seeds from England, to be forwarded by the overland conveyance. By this arrangement it is hoped the consignment of next season will be more perfect, and give greater satisfaction to the members.

English Fruit Trees.

The good condition in which a supply of fruit trees, ordered last year from England, had reached, induced the Society to obtain a further assortment this year. A portion of this supply, shipped on the *Agincourt*, has come to hand in even better condition than the last, *with the loss of only one tree.* About half of this stock has been transferred to the garden of the Bhauglepore Branch Society, and the remainder distributed to members. To the liberality of Captain Nisbet, commander of the *Agincourt*, the Society is indebted for a further fine supply of fruit trees, which, at his suggestion, has been despatched to the Hills.

Nursery Garden. Sugar Cane culture, and distribution.

The distribution of sugar cane from the Society's Nursery Garden, has not been so extended as during 1840-41, but greater than that of last year. The total produce during the present year may be estimated at twenty thousand canes, consisting of the Otaheite, Singapore, Bourbon and

China varieties. Of this number, about twelve thousand have been distributed, the remainder is to be converted into *goor.*

Guinea Grass, Tobacco, the Mauritius Black Bean.

Large supplies of tobacco seed of sorts, of guinea grass seed and "pois noire" have been gathered during the year, and distributed. In consequence of the continued demand, a larger cultivation of the guinea grass has been made.

Morus multicaulis, Pandanus vacoa, &c.

Many cuttings of the Morus multicaulis, with plants of the Pandanus vacoa,[*] have been disposed of. For the latter plant, the Society is indebted to Mr. T. F. Henley, a member, who presented a quantity of seed in the early part of the year. This gentleman has promised to procure a further supply from the Mauritius, to admit of its distribution by the Society during next year.

In addition to the above and several other cultures, a portion of ground has been appropriated for the growth of European vegetables, with a view to raise seed for distribution, and to obviate the necessity of indenting, in future, for such large annual supplies from abroad.

Literary Dept. Journal of the Society.

The change in the Literary Department, from an annual volume of Transactions to a Monthly Journal, was noticed in the last Report. It now only remains to add, that this has been carried out, and ten numbers have been published during the year.

Acknowledgment to Correspondents.

The Society would take this opportunity to acknowledge its obligations to its correspondents for the several communications which have been presented during the year and published in the Journal. To Mr. Wray, for his "Sugar Planters' Companion;" to Mr. Finnie, for his paper regarding the failure of the cotton crops at the Government Experimental Farms in the Doab; to Dr. Robert Wight, for his suggestions for the better transmission of plants from one part of India to another, and for his various communications regarding the progress of the Government Cotton Farm at Coimbatore; to the Honorable Mr. Anstruther, for communicating the result of experiments made at Ceylon with Carolina paddy; to Mr. Tonnochy, for particulars regarding an oil-giving-plant in the district of Bolundshahur; to Mr. Henley, for his notes on the Pandanus vacoa or Screw Pine; to the Medical Board for some correspondence from

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[*] The leaves of this tree make a strong and excellent material for bags, and is much employed by the Mauritius Sugar Planters. For particulars, see Mr. Henley's paper, in the 2d Volume of the Journal.

Dr. W. Montgomerie at Singapore, relative to a variety of caoutchouc termed Gutta Percha; to Captain Hollings, for his reports regarding the garden of the Lucknow Branch Agricultural Society, and for replies to queries concerning manures from Lucknow and Fyzabad; to Mr. Hamilton Bell, for some further particulars regarding the Berareea cotton; to Dr. A. Grant, (H. M. 55th Regiment,) Mr. Tradescant Lay, and the Rev. C. Gutzlaff, for their replies to queries concerning manures employed by Chinese Agriculturists; to Mr. Sconce, for his communications respecting hemp, flax and coffee culture at Chittagong; to Dr. Alexander Gibson, for his practical remarks on the culture and preparation of senna in the Bombay Presidency, and for his report of trials made of the power of Bramah's Hydrostatic Press, as applied to the extraction of oil from various products; to Mr. C. E. Ravenshaw, for communicating the result of experiments for the introduction of American cotton into the province of Behar: to Lieut. J. C. Brooke, for some particulars regarding the salep plant procured at Kotra; to Mr. Edward O'Riley, for his remarks on coffee and sugar culture at Amherst, to the Government of Bengal, for correspondence connected with the unsuccessful culture of American cotton at the Government Farm at Goruckpore; and to Mr. A. H. Landers, for his paper regarding the vegetable products, &c. of the Shan country.

Call for further assistance.

The Society cannot quit this subject without reiterating the call made in the last Annual Report, for contributions from the many Indigo Planters and Agriculturists, resident in various parts of the country. It has been well observed, in one of the earlier numbers, that the quantity as well as the quality of the original matter which the Journal must contain, is mainly dependent upon the communications of the Mofussil members of the institution. The Society indulge the hope, that more will follow the example of the correspondents whose names are alluded to above, and that they will not only come forward with the result of their own experience, but induce others to assist in so good a cause. It would seem that many are loath to address the Society under the belief, either that the subject has been previously brought to notice, or that it is not of sufficient importance to warrant its communication. Such considerations should not be allowed to prevail. It is possible that information, even of the most trifling nature, may be turned to account; and admitting that the subject may have been already treated on, yet it may not have received that degree of attention which its merits deserve: in that case, its renewal or re-agitation, may have the effect of awakening that interest, which a former communication failed to excite.

Conclusion.

In closing this brief Summary of the business of the year, the Society hopes for the continued co-operation of all who are interested in its objects, and trusts, the next Report may shew, that its request for greater assistance in the literary department, has not been made in vain.

## *Statement of Receipts and Disbursements of the Agricultural and Horticultural Society of India, from 1st January to the 31st December, 1843.*

### RECEIPTS.

| | | | | | | |
|---|---|---|---|---|---|---|
| From Members, subscriptions collected during the year, ... | | | | 14,115 | 4 | 6 |
| ,, Government annual donation, ... ... ... | 1,045 | 0 | 0 | | | |
| ,, Do. monthly allowance for 12 months at 135 : 13 : 6 per month, | 1,630 | 2 | 0 | | | |
| | | | | 2,675 | 2 | 0 |
| ,, Proceeds of a portion of surplus Cape vegetable seeds sold during the year, ... ... ... ... | 227 | 0 | 0 | | | |
| ,, Ditto, of sugar cane, delivered from the Nursery Garden, | 306 | 14 | 6 | | | |
| ,, Ditto, of copies of the Transactions of the Society, | 56 | 0 | 0 | | | |
| ,, Ditto, of copies of the Journal of the Society, ... | 17 | 8 | 0 | | | |
| ,, Ditto, of old seed boxes sold, ... ... | 14 | 7 | 0 | | | |
| ,, the Secretary, being the balance of amount awarded for prizes to mallees at the Exhibitions held on 26th January and 28th October, ... ... ... ... | 20 | 0 | 0 | | | |
| ,, the Collector of Patna, being the amount cost of ten maunds of Carolina paddy, purchased by the Society, on account of the Commissioner of Patna, ... ... ... | 61 | 15 | 0 | | | |
| ,, Accruings of interest on fixed assets, ... ... | 461 | 11 | 3 | | | |
| | | | | 1,165 | 7 | 9 |
| Total Receipts, Co's. Rs. ... | | | | 17,955 | 14 | |
| Balance in the Bank of Bengal, on the 31st December, 1842, | 554 | 1 | 11 | | | |
| Ditto, in the hands of the Government Agent on ditto, ... | 160 | 7 | 5 | | | |
| | | | | 714 | 9 | |
| Grand Total Receipts, Co's. Rs. ... | | | | 18,670 | 7 | 7 |

### DISBURSEMENTS.

#### FOREIGN VEGETABLE AND FLOWER SEEDS.

| | | | | |
|---|---|---|---|---|
| By C. N. Villet, for Cape garden and flower seeds, ... ... | 2,000 | 0 | 0 | |
| ,, Messrs. Landreth and Co. of Philadelphia, for American vegetable and flower seeds, ... ... ... ... | 807 | 8 | 0 | |

#### AMERICAN COTTON SEED.

| | | | | |
|---|---|---|---|---|
| By Messrs. Grindlay and Co. for charges incurred for freight, &c. on New Orleans cotton seed, transmitted via Liverpool, ... | 181 | 12 | 0 | |

#### FLAX AND HEMP SEED.

| | | | | |
|---|---|---|---|---|
| By Mr. Deneef for a quantity of acclimated English flax seed, ... | 42 | 0 | 0 | |
| ,, Mr. Holstein, for a quantity of Russian hemp seed, ... | 56 | 0 | 0 | |

#### ENGLISH FRUIT TREES, &c.

| | | | | |
|---|---|---|---|---|
| By Dr. Royle, to meet the cost of English fruit trees, bulbs, &c. ... | 254 | 0 | 0 | |
| ,, Messrs. Grindlay and Co. for freight and sundry other charges for transmission of fruit trees in 1842, ... ... | 70 | 14 | 9 | |
| | | | | 3,412 |

### SOCIETY'S TRANSACTIONS, PROCEEDINGS, &c.

| | | | | | | |
|---|---|---|---|---|---|---|
| By Baptist Mission Press, for printing the proceedings of the Society, for February, March, April, May, and June 1842, ... | 617 | 10 | 0 | | | |
| ,, Bishop's College Press, for printing 100 copies of Annual Report for 1842, and 500 copies of "List of Members," ... | 100 | 0 | 0 | | | |
| ,, Thacker and Co. for expences incurred by Allen and Co. of London, for duty and other charges on 140 copies of the Transactions of the Society, vol. 1 to 7, transmitted to them for sale, on account of the Society, ... ... ... | 79 | 1 | 0 | | | |
| ,, Grindlay and Co., for sundry charges on 10 copies of vol. 8, sent in 1842, for presentation to several Societies and individuals in Great Britain, ... ... ... ... | 9 | 15 | [illegible] | | | |
| | | | | 806 | 10 | 5 |

### LIBRARY.

| | | | |
|---|---|---|---|
| By Books purchased during the year for the Library, ... ... | 97 | 9 | 4 |

### PRINTING.

| | | | |
|---|---|---|---|
| By sundry parties, for printing receipts, &c. ... ... | 76 | 3 | 0 |

### JOURNAL.

| | | | | | | |
|---|---|---|---|---|---|---|
| By Printer Medical Journal Press, for printing Nos. 4 and 5 of vol. 1 of the Journal, ... ... ... ... | 369 | 0 | 0 | | | |
| ,, Bishop's College Press, for printing Nos. 1 to 6 of vol. 2 of the Journal, ... ... ... ... ... | 809 | 4 | 0 | | | |
| ,, C. Grant, for lithographing plates for Journal, ... ... | 72 | 0 | 0 | | | |
| ,, Printer Medical Journal Press for lithographing a plate, and for other petty charges, ... ... ... ... | 17 | 0 | 0 | | | |
| ,, T. Ballin for striking off impressions on covers for Nos. 4 and 5 of vol. 1, and Nos. 1 to 3 of vol. 2, ... ... ... | 98 | 1 | 9 | | | |
| ,, W. Rushton for 16 reams of double demy paper, ... ... | 320 | 0 | 0 | | | |
| ,, Thacker and Co. for 30 reams of white and two reams of colored demy. ... ... ... ... ... | 361 | 7 | 0 | | | |
| ,, Baptist Mission Press for 3 reams of demy, ... ... | 40 | 8 | 0 | | | |
| ,, Neelmoney Holdar, for 8 quires of colored demy, ... ... | 5 | 0 | 0 | | | |
| | | | | 2,095 | 4 | 9 |

### NURSERY GARDEN.

| | | | |
|---|---|---|---|
| By expences incurred on account of the Nursery Garden, from 1st December 1842 to 30th November 1843, ... ... | 1,962 | 8 | 9 |

### ESTABLISHMENT.

| | | | |
|---|---|---|---|
| By amount for Establishment, from 1st December 1842 to 30th November 1843, ... ... ... ... ... | 4,321 | 0 | 0 |

### MEDALS.

| | | | |
|---|---|---|---|
| By Hamilton and Co., for gold and silver medals manufactured, engraved on, &c. ... ... ... ... ... ... | 843 | 10 | 6 |

### LOAN ACCOUNT.

| | | | |
|---|---|---|---|
| By Amount paid back to the Bank of Bengal for loan taken in 1842, ... ... ... ... ... | 1,500 | 0 | 0 |

### INTEREST.

| | | | | | | |
|---|---|---|---|---|---|---|
| By Bank of Bengal, interest on loan of 1,500 Rs. from 6th October 1842 to 14th August 1843, ... ... ... ... | | | | 99 | 11 | 8 |

### PECUNIARY REWARDS.

| | | | | | | |
|---|---|---|---|---|---|---|
| By prizes to mallees at the Exhibitions held on the 26th January and 28th October, ... ... ... ... | 400 | 0 | 0 | | | |
| ,, the Hooghly Branch Society, annual amount, ... ... | 50 | 0 | 0 | | | |
| ,, the Bhauglepore ditto ditto, ... ... ... | 50 | 0 | 0 | | | |
| | | | | 500 | 0 | 0 |

### FREIGHT.

| | | | | | | |
|---|---|---|---|---|---|---|
| By freight on boxes of seeds, from America, Madras, Patna, &c. ... ... | | | | 88 | 4 | 6 |

### ADVERTISEMENTS.

| | | | | | | |
|---|---|---|---|---|---|---|
| By advertising in the public prints, notice of meeting, distribution of seeds, sugar cane, &c. &c. &c. ... ... ... ... | | | | 328 | 15 | 0 |

### STATIONERY.

| | | | | | | |
|---|---|---|---|---|---|---|
| By stationery for Office books, and for the use of the Office, ... ... | | | | 166 | 7 | 0 |

### POSTAGE AND PETTY CHARGES.

| | | | | | | |
|---|---|---|---|---|---|---|
| By postage on the Journal, and for letters sent and received, and for petty expences, ... ... ... ... ... | | | | 1,074 | 12 | 9 |

### SUNDRIES.

| | | | | | | |
|---|---|---|---|---|---|---|
| By paid to extra packer-men for subdividing seeds, ... ... | 6 | 0 | 0 | | | |
| ,, to extra writers, for writing on papers of ditto, ... | 9 | 8 | 0 | | | |
| ,, for a set of flax dressing implements, ... ... | 20 | 0 | 0 | | | |
| ,, to Mr Wray, for six copies of his "Sugar Planter's Companion," ... ... ... ... ... | 30 | 0 | 0 | | | |
| ,, Custom House duty on brown packing paper, ... ... | 15 | 0 | 9 | | | |
| ,, present to Bandsmen of the 10th Regiment, ... ... | 48 | 0 | 0 | | | |
| | | | | 128 | 8 | 9 |
| Total Disbursements, Rs. | | | | 17,501 | 13 | 8 |
| Balance in the Bank of Bengal on the 31st December 1843, | 946 | 7 | 3 | | | |
| Ditto in the hands of the Government Agent on ditto, ... | 222 | 2 | 8 | | | |
| Grand Total, Rupees ... | | | | 18,670 | 7 | 7 |

## MEMORANDUM.

### DISBURSEMENTS.

| | | |
|---|---|---|
| To amount of Disbursements during the year 1843, as per statement, ... ... ... | | 17,501 13 8 |
| Balance in the Bank of Bengal on the 31st December 1843, ... ... ... ... | 946 7 3 | |
| Ditto in the hands of the Government Agent on ditto, ... ... ... ... ... | 222 2 8 | |
| | | 1,168 9 11 |
| Total, Co's. Rs. | | 18,670 7 7 |

### RECEIPTS.

| | | |
|---|---|---|
| By amount of receipts during the year 1843, as per statement, ... ... ... ... ... | | 17,955 14 3 |
| ,, balance in the Bank of Bengal, on the 31st December 1842, ... ... ... ... ... | 554 1 11 | |
| ,, Ditto in the hands of the Government Agent on ditto, ... ... ... ... ... ... | 160 7 5 | |
| | | 714 9 4 |
| Total Co's. Rs. | | 18,670 7 7 |

### DEPENDENCIES.

| | |
|---|---|
| invested in Government Securities, lodged in the Government Agency Office, ... | 10,433 5 4 |
| Amount of Subscription in arrear, ... ... | 6,577 4 0 |
| Total Co's. Rs. | 17,010 9 4 |

### LIABILITIES.

| | |
|---|---|
| Amount due by the Society for expences incured for printing its Transactions, Journal, &c. | 2,044 12 3 |
| Amount for prizes for cattle, improvement in the Indian churka, &c. &c. ... ... ... | 2,546 0 0 |
| Total, Co's. Rs. ... | 4,590 12 3 |